



# SDA 1000-5100 Large Dehumidifying Dryers with AP0 Controls

Part Number: 882.00292.00  
Bulletin Number: DH1-605-1  
Effective: 04/28/2008

Write Down Your Serial Numbers Here For Future Reference:

_____	_____
_____	_____
_____	_____

We are committed to a continuing program of product improvement.  
Specifications, appearance, and dimensions described in this manual are subject to change without notice.

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# Shipping Info

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## ***Unpacking and Inspection***

You should inspect the large dehumidifying dryer for possible shipping damage.

Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc.

## ***In the Event of Shipping Damage***

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

Notify the transportation company's local agent if you discover damage.

Hold the damaged goods and packing material for the examining agent's inspection. Do not return any goods before the transportation company's inspection and authorization.

File a claim with the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.

Advise customer service regarding your wish for assistance and to obtain an RMA (return material authorization) number.

## ***If the Shipment is Not Complete***

Check the packing list as back-ordered items are noted on the packing list. You should have:

- Large Dehumidifying Dryer
- Bill of lading
- Packing list
- Operating and Installation packet
- Electrical schematic and panel layout drawings
- Component instruction manuals

Re-inspect the container and packing material to see if you missed any smaller items during unpacking.

## ***If the Shipment is Not Correct***

If the shipment is not what you ordered, **contact the parts and services department immediately** at [262] 641-8610. Have the item and order numbers ready. *Hold the items until you receive shipping instructions.*

### **Returns**

Do not return any damaged or incorrect items until you receive shipping instructions from the shipping department.

### **Credit Returns**

Prior to the return of any material **authorization** must be given by **the manufacturer**. A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

ALL returned material purchased from **the manufacturer** returned is subject to 15% (\$75.00 minimum) restocking charge.

ALL returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

No credit will be issued for material that is not within the manufacturer's warranty period and/or in new and unused condition, suitable for resale.

### **Warranty Returns**

Prior to the return of any material, authorization must be given by **the manufacturer**. A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

All returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

After inspecting the material, a replacement or credit will be given, at **the manufacturer's** discretion. If the item is found to be defective in materials or workmanship, and it was manufactured by our company, purchased components are covered under their specific warranty terms.

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# Chapter 1: Safety

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## 1-1 How to Use This Manual

Use this manual as a guide and reference for installing, operating, and maintaining the large dehumidifying dryer. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity.

This manual covers only light corrective maintenance. No other maintenance should be undertaken without first contacting a service engineer.

The Functional Description section outlines models covered, standard features, and safety features. Additional sections within the manual provide instructions for installation, pre-operational procedures, operation, preventive maintenance, and corrective maintenance.

The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the large dehumidifying dryer. We can also provide the assistance of a factory-trained technician to help train your operator(s) for a nominal charge. This section includes instructions, checks, and adjustments that should be followed before commencing with operation of the dryer. These instructions are intended to supplement standard shop procedures performed at shift, daily, and weekly intervals.

The Operation chapter includes a description of electrical and mechanical controls, in addition to information for operating the dryer safely and efficiently.

The Maintenance chapter is intended to serve as a source of detailed assembly and disassembly instructions for those areas of the equipment requiring service. Preventive maintenance sections are included to ensure that the dehumidifying dryer provides excellent, long service.

The Troubleshooting chapter serves as a guide for identification of most common problems. Potential problems are listed, along with possible causes and related solutions.

The Appendix contains technical specifications, drawings, schematics, parts lists, and available options. A spare parts list with part numbers specific to your machine is provided with your shipping paperwork package. Refer to this section for a listing of spare parts for purchase. Have your serial number and model number ready when ordering.

### **Safety Symbols Used in this Manual**







The following safety alert symbols are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

**DANGER!** *DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.*

**WARNING!** *WARNING indicates a potentially hazardous situation or practice that, if not avoided, could result in death or serious injury.*

**Caution!** *CAUTION indicates a potentially hazardous situation or practice that, if not avoided, may result in minor or moderate injury or in property damage.*

## Dryer Safety Tags

Tag	Description	Tag	Description
	Read Operation & Installation Manual		High Voltage Inside Enclosure
	Hot!		Lifting Point
	Protected Earth Ground		Earth Ground

## 1-2 Warnings and Precautions

Our equipment is designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes. This may include, but is not limited to OSHA, NEC, CSA, SPI, and any other local, national and international regulations.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this equipment, use good judgment and follow these safe practices:

- Read and follow these operation and installation instructions when installing, operating, and maintaining this equipment. If these instructions become damaged or unreadable, additional copies are available from the manufacturer.**
- Follow all **SAFETY CODES**.
- Wear **SAFETY GLASSES** and **WORK GLOVES**.
- Work only with approved tools and devices.
- Disconnect and/or lock out power before servicing or maintaining the equipment.
- Use care when **LOADING, UNLOADING, RIGGING, or MOVING** this equipment.
- Operate this equipment within design specifications.
- OPEN, TAG, and LOCK ALL DISCONNECTS** before working on equipment. You should remove the fuses and carry them with you.
- Make sure the equipment and components are properly **GROUNDING** before you switch on power.
- When welding or brazing in or around this equipment, make sure **VENTILATION** is **ADEQUATE. PROTECT** adjacent materials from flame or sparks by shielding with sheet metal. An approved **FIRE EXTINGUISHER** should be nearby and ready for use if needed.
- Do not restore power until you remove all tools, test equipment, etc., and the equipment and related components are fully reassembled.



- ☑ Only **PROPERLY TRAINED** personnel familiar with the information in this manual should work on this equipment.

We have long recognized the importance of safety and have designed and manufactured our equipment with operator safety as a prime consideration. We expect you, as a user, to abide by the foregoing recommendations in order to make operator safety a reality.

## 1-3 Responsibility

These machines are constructed for maximum operator safety when used under standard operating conditions and when recommended instructions are followed in the maintenance and operation of the machine.

All personnel engaged in the use of the machines should become familiar with their operation as described in this manual.

Proper operation of the machine promotes safety for the operator and all workers in its vicinity.

Each individual must take responsibility for observing the prescribed safety rules as outlined. All warning and danger signs must be observed and obeyed. All actual or potential danger areas must be reported to your immediate supervisor.

### ***General Responsibility***

No matter who you are, safety is important. Owners, operators and maintenance personnel must realize that every day, safety is a vital part of their jobs.

If your main concern is loss of productivity, remember that production is always affected in a negative way following an accident. The following are some of the ways that accidents can affect your production:

- Loss of a skilled operator (temporarily or permanently)
- Breakdown of shop morale
- Costly damage to equipment
- Downtime

An effective safety program is responsible and economically sound.

Organize a safety committee or group, and hold regular meetings. Promote this group from the management level. Through this group, the safety program can be continually reviewed, maintained, and improved. Keep minutes or a record of the meetings.

Hold daily equipment inspections in addition to regular maintenance checks. You will keep your equipment safe for production and exhibit your commitment to safety.

Please read and use this manual as a guide to equipment safety. This manual contains safety warnings throughout, specific to each function and point of operation.

### ***Operator Responsibility***

The operator's responsibility does not end with efficient production. The operator usually has the most daily contact with the equipment and intimately knows its capabilities and limitations.

Plant and personnel safety is sometimes forgotten in the desire to meet incentive rates, or through a casual attitude toward machinery formed over a period of months or years. Your

employer probably has established a set of safety rules in your workplace. Those rules, this manual, or any other safety information will not keep you from being injured while operating your equipment.

Learn and always use safe operation. Cooperate with co-workers to promote safe practices. Immediately report any potentially dangerous situation to your supervisor.

- ☑ **NEVER** place your hands or any part of your body in any dangerous location.
- ☑ **NEVER** operate, service, or adjust the dryer without appropriate training and first reading and understanding this manual.
- ☑ **NEVER** try to pull material out of the dryer with your hands while it is running!
- ☑ Before you start the dehumidifying dryer, check the following:
  - Remove all tools from the dryer;
  - Be sure no objects (tools, nuts, bolts, clamps, bars) are laying in the area;
- ☑ If your dryer has been inoperative or unattended, check all settings before starting.
- ☑ At the beginning of your shift and after breaks, verify that the controls and other auxiliary equipment are functioning properly.
- ☑ Keep all safety guards in place and in good repair. **NEVER** attempt to bypass, modify, or remove safety guards. Such alteration is not only unsafe, but will void the warranty on your equipment.
- ☑ When changing control settings to perform a different mode of operation, be sure selector switches are correctly positioned. Locking selector switches should only be adjusted by authorized personnel and the keys removed after setting.
- ☑ Report the following occurrences **IMMEDIATELY**:
  - unsafe operation or condition
  - unusual dryer action
  - leakage
  - improper maintenance
  - **NEVER** stand or sit where you could slip or stumble into the dehumidifying dryer while working on it.
- ☑ **DO NOT** wear loose clothing or jewelry, which can be caught while working on the dryer. In addition, cover or tie back long hair.
- ☑ Clean the dehumidifying dryer and surrounding area **DAILY**, and inspect the machine for loose, missing or broken parts.
- ☑ Shut off power to the dryer when it is not in use. Turn the switch to the **OFF** position, or unplug it from the power source.

### ***Maintenance Responsibility***

Proper maintenance is essential to safety. If you are a maintenance worker, you must make safety a priority to effectively repair and maintain equipment.

Before removing, adjusting, or replacing parts on a machine, remember to turn off all electric supplies and all accessory equipment at the machine, and disconnect and lockout electrical and pneumatic power. Attach warning tags to the disconnect switch and air shutoff valve.

When you need to perform maintenance or repair work on a dehumidifying dryer above floor level, use a solid platform or a hydraulic elevator. If there is a permanently installed catwalk on your dryer, use it. The work platform should have secure footing and a place for tools and parts. **DO NOT** climb on the dehumidifying dryer, machines, or work from ladders.

If you need to repair a large component, use appropriate handling equipment. Before you use handling equipment (portable “A” frames, electric boom trucks, fork trucks, overhead cranes) be sure the load does not exceed the capacity of the handling equipment or cause it to become unstable.

Carefully test the condition of lifting cables, chains, ropes, slings, and hooks before using them to lift a load.

Be sure that all non-current carrying parts are correctly connected to earth ground with an electrical conductor that complies with current codes. Install in accordance with national and local codes.

When you have completed the repair or maintenance procedure, check your work and remove your tools, rigging, and handling equipment.

Do not restore power to the dehumidifying dryer until all persons are clear of the area. **DO NOT** start and run the dryer until you are sure all parts are functioning correctly.

**BEFORE** you turn the dehumidifying dryer over to the operator for production, verify all enclosure panels, guards and safety devices are in place and functioning properly.

### ***Reporting a Safety Defect***

If you believe that your equipment has a defect that could cause injury, you should immediately discontinue its use and inform the manufacturer.

The principle factors that can result in injury are failure to follow proper operating procedures (i.e. lockout/tagout), or failure to maintain a clean and safe working environment.

# Chapter 2: Functional Description

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## 2-1 Models Covered in This Manual

This manual provides operation, installation, and maintenance instructions for 600-3000 cfm Large Dehumidifying Dryers with AP0 control. These dryers are available with electric heaters or gas burners. Gas dryers are indicated with a "G" in the model number. Model numbers are listed on the serial tag. Make sure you know the model and serial number of your equipment before contacting the manufacturer for parts or service.

Our dehumidifying dryers are designed to generate heated, dehumidified air at carefully controlled temperatures for use in closed-loop plastic drying systems. Dehumidifying dryers are sized to meet the specific requirements stated by the Customer at the time of purchase.

## 2-2 General Description

Moisture removal from hygroscopic (moisture attracting) plastic pellets is an essential step in the manufacture of high-quality plastic products.

Our Dehumidifying Dryers are used by the plastics industry to generate very low dewpoint air that is heated to a controlled temperature for drying plastic pellets and regrind.

The drying system consists of a dry air source and drying hoppers with process heating controls. The dry air source controls two primary sub-systems, the process air and the regeneration circuit. Each dryer has a left and a right desiccant bed so that one bed can regenerate while the other is in use. 2000-3000 cfm dryers feature two sets of desiccant beds, for a total of four desiccant beds.

The drying system can be configured for one drying hopper or for as many as 20 hoppers. The process air heater can be located on the dryer or on each individual drying hopper. Heaters that are located on the drying hoppers can be set up with their own independent controls or can be controlled centrally using the main dryer controller.

### ***Specifying a Drying System***

There were many variables considered in the selection of your drying system, including: type of materials, residence time, throughput of the extruder or injection molding machine, ambient air moisture and temperature, and the altitude at the processing site. Should your operating environment change, we can advise you on necessary equipment, process time and temperature modifications.

### ***What is Desiccant?***

Desiccant is a material that attracts and holds (absorbs) water from the air. The desiccant our dryers use is a synthetic crystalline metal aluminosilicate that is blended with a clay binder and formed into beads.

Absorbed water is driven from saturated desiccant by heating it to a high temperature (reducing the desiccant's capacity to hold water) and forcing air through it. This moisture removal process is called "regeneration".

### ***The Closed Loop Drying System***

These dehumidifying dryers force hot, dry air through the resin in the drying hopper, where the air picks up moisture from the material and is drawn back to the dryer. In the dryer,

moisture is stripped from the air by a desiccant bed. The dried process air is then re-heated and delivered back into the drying hopper to dry material again.

This system is a "closed loop", because ambient (outside) air is never introduced into the process air. The closed loop system is used by the manufacturer because the process air is typically much drier than ambient air, even after carrying moisture out of the plastic resin. Recycling process air maintains drying efficiency at a consistently high level.

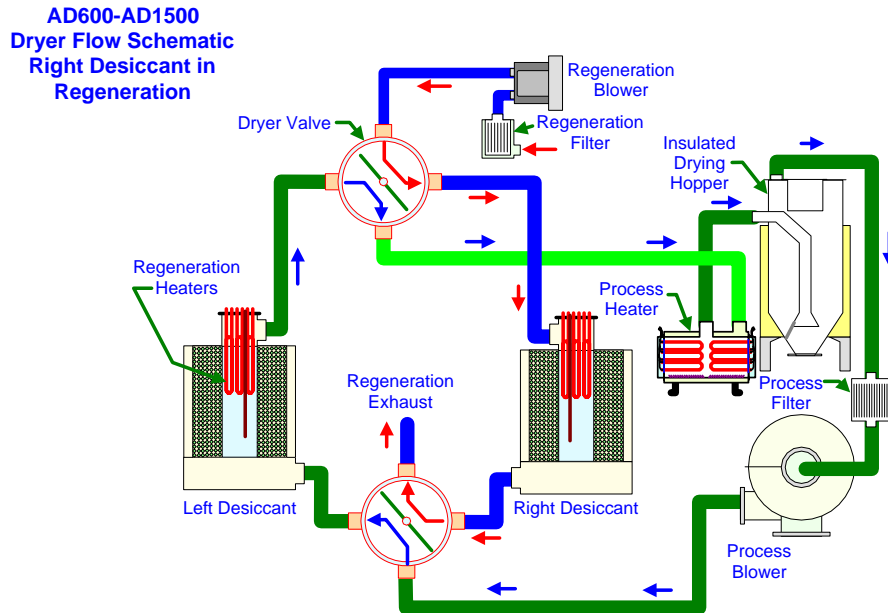
### **The Process/Regeneration Cycle**

There are two desiccant beds in a dryer up to 1500 cfm. Larger dryers have two beds each for right and left beds. While one desiccant bed is on-line in the process air loop, the other is off-line being regenerated (see Figure 1).

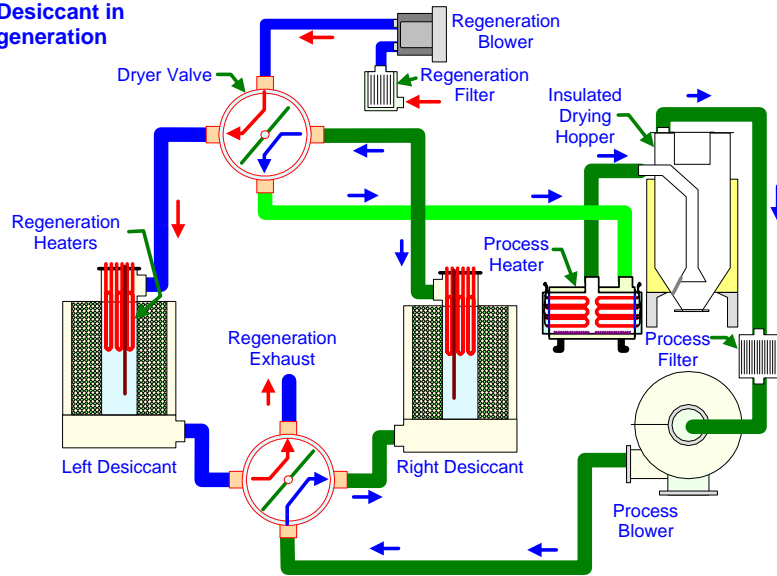
When a desiccant bed is on-line, it absorbs moisture from the process air. The desiccant will become saturated with moisture and need to be regenerated. The dryer automatically redirects the process airflow to the second bed and starts regenerating the first bed.

During regeneration, air is heated to approximately 550°F and forced through the saturated desiccant. The moisture driven off the desiccant is bled to the atmosphere. The regeneration heater is then turned off while the regeneration blower continues to blow air through the desiccant bed until it is cooled.

**Figure 1: Regeneration Cycle**



**AD600-AD1500  
Dryer Flow Schematic  
Left Desiccant in  
Regeneration**



***Sequence of Operation***

When the dryer is started, the main air valve rotates 360° and then moves to place the last successfully regenerated desiccant bed online. If the dryer was powered off using the main power disconnect or E-stopped, then the regenerating bed is placed back into regeneration, and the regeneration cycle is started over. The main air valve is allowed a period of time to move from one position to the other. If the main air valve does not complete positioning within the allotted time, then a “Main Air Valve Fail” alarm is generated and the dryer stops the process air blower and disables the drying hoppers and regeneration circuit.

If the closed loop regeneration option is enabled, the regeneration closed loop valve moves to the open loop position. The system always begins the cooling phase for a regeneration cycle using ambient (open loop) air. The closed loop regeneration valve is allowed a period of time to move from the closed to the open loop position and a “Closed Loop Valve” alarm is generated if the valve fails to reach the commanded position within this time. This alarm will disable the regeneration circuit but does not stop the process air system or drying hoppers.

Once the main air valve and closed loop regeneration valve are in place, the process air blower starts. The system monitors the process air blower’s overload, starter auxiliary contact feedback and air pressure. Loss of any of these items when the process air blower is running will cause the process air blower and the drying hopper’s process heaters to shut down.

The process air heaters will turn on after a delay to allow the process air blower to accelerate the operating speed.

During normal operation, one set of desiccant beds is connected to the process air circuit while the other set is being regenerated. When the offline beds are done regenerating, they will be switched into the process air circuit and the other beds will be regenerated. The default bed switch setting is based on time. If the Dewpoint Switch option is enabled, the beds will switch when the process air dewpoint reaches the dewpoint switch point. The dewpoint option will automatically disable itself and an alarm will be generated if the dewpoint sensor or related electronics fail.

## 2-3 Controller Description

The AP0 control package uses a relay logic controller to control the operation of the dryer. See below for descriptions of each screen.

**Figure 2: Controller Screen Descriptions**

**Regen Set Screen.** Displays heating and cooling times for regeneration. Also used to change times if necessary.

**Material Miser OFF Screen.** Used to enable material miser valve.

**Material Miser ON Screen.** Used to disable material miser valve.

**Closed Loop Regen OFF Screen:** Used to enable closed loop cooling on regeneration.

**Closed Loop Regen ON Screen:** Used to disable closed loop cooling on regeneration.

**I/O Status Screen.** Used to view the status of inputs and outputs for the dryer.

**Alarm Screen.** Shows which alarm the dryer gets.

## 2-4 Standard Features

### ***Mechanical Features***

- ☑ 180°F – 250°F Drying temperature range
- ☑ High regeneration temperature control safeties
- ☑ 13X desiccant (molecular sieve)
- ☑ Easy to access process and regeneration
- ☑ High pressure centrifugal blower
- ☑ Dew point +15° F to –40° F

### ***Electrical Features***

- ☑ Electrically-actuated air valve
- ☑ NFPA79, UL & CUL machinery electrical standards (Electric Dryers) includes:
  - NEMA 12 controls, components & enclosure
  - Non-fused electrical disconnect
  - Solid state relays for heater control
  - Branch fusing
  - Lockable power disconnects
  - Regeneration temperature control
  - “Process high temp” indication light and audible alarm
  - Sequence shutdown switch
- ☑ NFPA86, UL, AGA & CGA machinery electrical standards (Gas Dryers)
- ☑ Available supply voltages of 208, 230, 460, 575/3/60 and 400/3/50

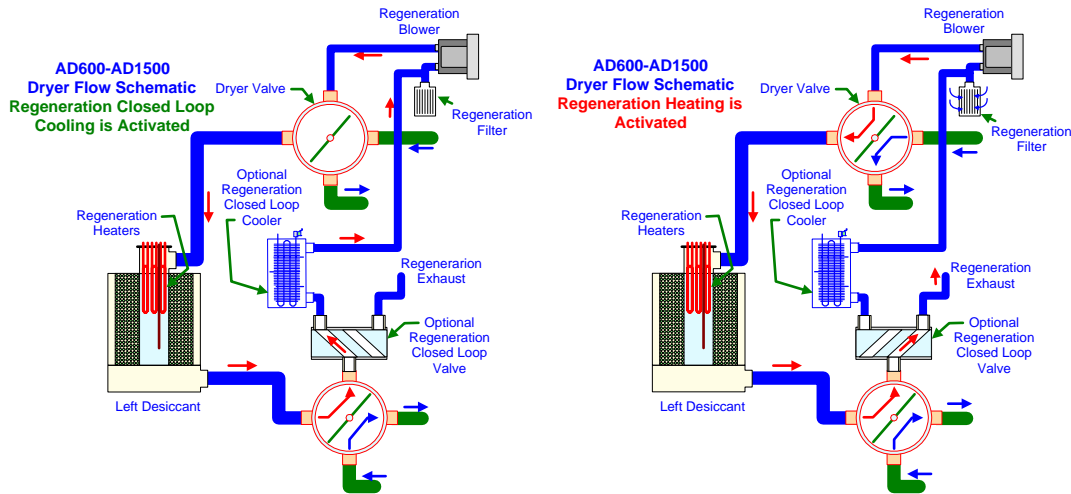


## 2-5 Options

### Closed-Loop Regeneration

An optional regeneration closed-loop valve and heat exchanger can be used to close the regeneration loop during the cooling portion of the regeneration cycle. If this option is enabled on the dryer, air will be bled to the atmosphere until the heating portion of the regeneration cycle is finished. Then, the regeneration closed loop valve will direct air through a water-cooled heat exchanger and back into the regeneration loop (see Figure 3 and **Section 3-6: Connecting Aftercooler/Precooler Cooling Water**).

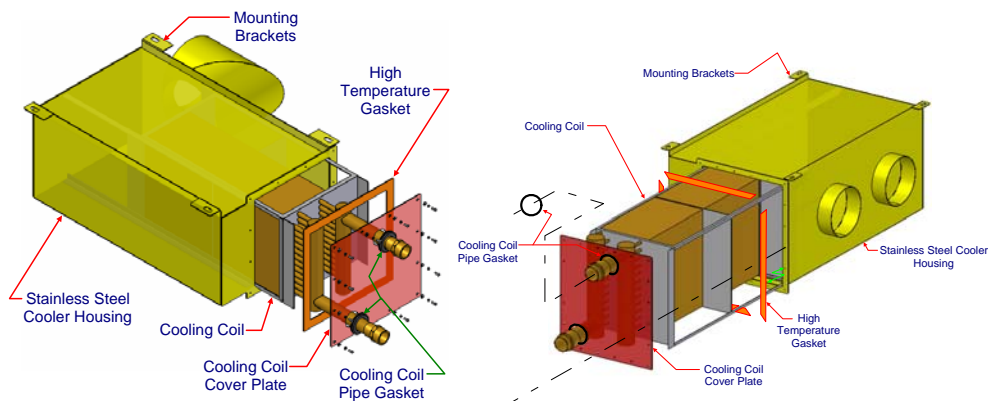
Figure 3: Closed Loop Regeneration



### Process Aftercooler

The optional aftercooler cools the moist air returning to the dryer from the drying hopper. The aftercooler can cool the return air from 250°F to about 150°F. This maintains the dryer's efficiency and condenses the unwanted plasticizer from the air stream. The aftercooler requires a cooling water connection (see Figure 4).

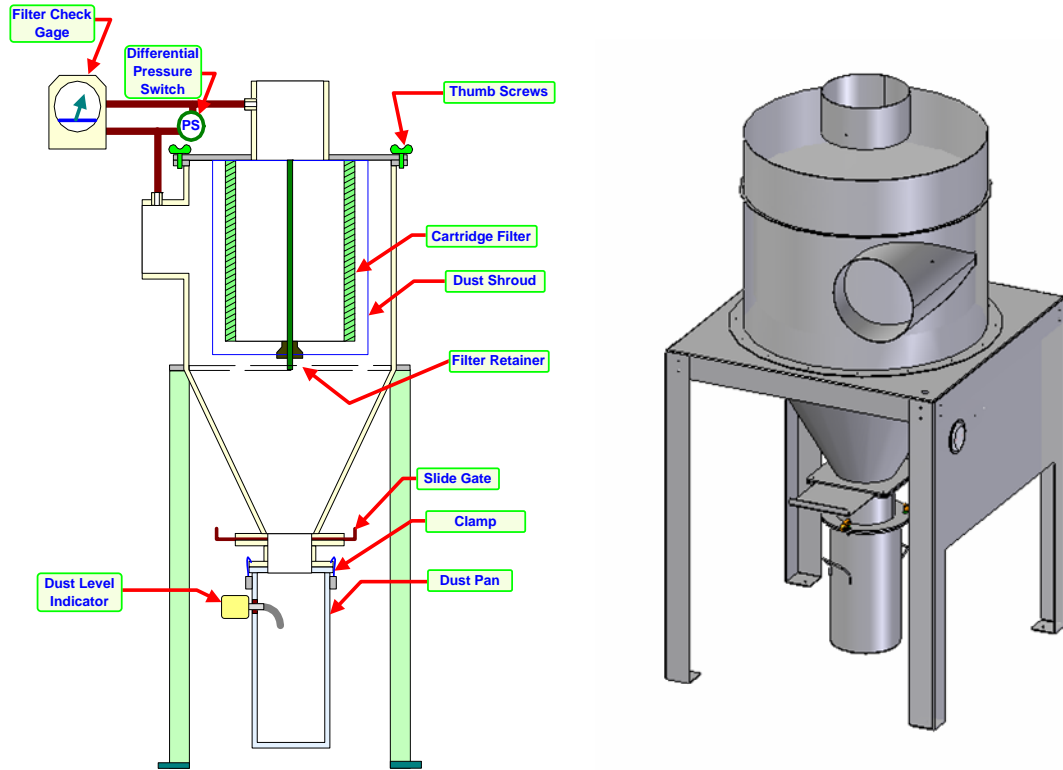
Figure 4: Process Aftercooler



### Process Air Dust Collector

The optional process air dust collector consists of a filter, dust can, pressure gauge, and optional pressure switch (see Figure 5). The gauge will let you know whether it is time to clean out your filters. The optional dirty filter alarm will be activated if the filter is dirty.

Figure 5: Process Air Dust Collector



### Material Overdrying Protection

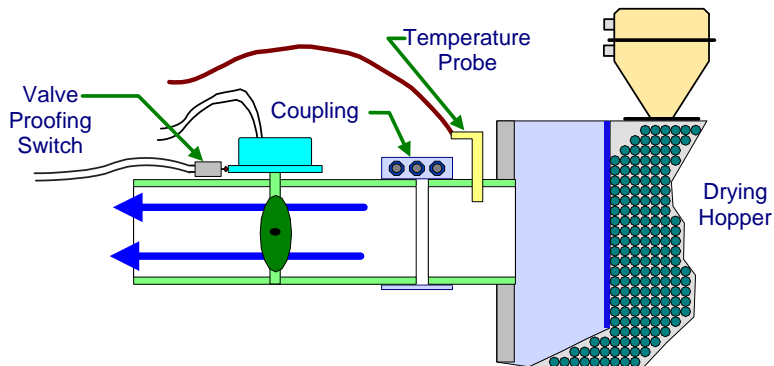
Material Overdrying Protection is an automatic system used to reduce the chance of overdrying, and possibly melting, the resin in the drying hopper. Material Overdrying Protection activates when the return temperature is above a set value, indicating that all the resin in the hopper is dry.

The control system monitors the return air temperature and automatically changes the process air setpoint to the **SET BACK SETPOINT** value when the return air temperature rises above the set back temperature. The process air setpoint returns to normal when the return air temperature falls below the **SETUP TEMPERATURE** value. The target values for changing the process air setpoint can be adjusted on the Mat Protect screen.

### Recommended Temperature Settings

Drying Temperature (°F)	160	180	200	220	240	260	280	300	320	340	360
Setpoint	120	125	130	135	135	140	150	160	170	180	200

**Figure 6: Material Miser/Air Balance Valve**



***Mechanical Options***

- Low temperature operation (120°F to 250°F)
- High temperature operation (180°F to 400°F)
- Precooler (Required for temperatures below 180°F, used with low temperature operation)
- Aftercooler (Required for temperatures above 250°F, used with high temperature operation)
- Plasticizer trap / Aftercooler w/filter
- Automatic airflow reduction valve 13X desiccant
- Closed loop cooling valve
- Dew point +15°F to -80°F
- Sound insulation for under 85 DBA noise level
- Dust collector

***Electrical Options***

- Hopper mounting of the process heater box
- Remote operator interface (with standard controller only)
- CSA approval
- UL rating
- 400/3/50 supply voltage (includes CE compliance)

## 2-6 Safety Devices and Interlocks

This section includes information on safety devices and procedures that are inherent to the large dehumidifying dryer. This manual is not intended to supersede or alter safety standards established by the user of this equipment. Instead, the material contained in this section is recommended to supplement these procedures in order to provide a safer working environment.

At the completion of this section, the operator and maintenance personnel will be able to do the following:

- Identify and locate specific safety devices.
- Understand the proper use of the safety devices provided.
- Describe the function of the safety device.

### ***Safety Circuit Standards***

Safety circuits used in industrial systems protect the operator and maintenance personnel from dangerous energy. They also provide a means of locking out or isolating the energy for servicing equipment.

Various agencies have contributed to the establishment of safety standards that apply to the design and manufacture of automated equipment. The Occupational Safety and Health Administration (OSHA) and the Joint Industrial Council (JIC) are just a few of the organizations that have joined with the plastics industry to develop safety standards.

Every effort has been made to incorporate these standards into the design of the large dehumidifying dryer; however, it is the responsibility of the personnel operating and maintaining the equipment to familiarize themselves with the safety procedures and the proper use of any safety devices.

### ***Fail Safe Operation***

If a safety device or circuit should fail, the design must be such that the failure causes a "Safe" condition. As an example, a safety switch must be a normally open switch. The switch must be held closed with the device it is to protect. If the switch fails, it will go to the open condition, tripping out the safety circuit.

At no time should the safety device fail and allow the operation to continue. For example, if a safety switch is guarding a motor, and the safety switch fails, the motor should not be able to run.

### ***Safety Device Lock-Outs***

Some safety devices disconnect electrical energy from a circuit. The safety devices that are used on the large dehumidifying dryer are primarily concerned with electrical power disconnection and the disabling of moving parts that may need to be accessed during the normal operation of the machines.

Some of the safety devices utilize a manual activator. This is the method of initiating the safety lock out. This may be in the form of a plug, lever or a handle. Within this lockable handle, there may be a location for a padlock. Personnel servicing the equipment should place a padlock in the lockout handle.

In addition to the safety devices listed above, these dehumidifying dryers are equipped with a line cord plug. This allows the operator or maintenance personnel to unplug the system from its power source and tag it out. The plug can then be tagged with any number of approved electrical lockout tags available at most electrical supply stores.

**WARNING!** *Always disconnect and lockout all electrical power and pneumatic (i.e. compressed air) sources prior to servicing or cleaning the dehumidifying dryer. Failure to do so may result in serious injury. No one but the person who installed the lockout may remove it.*



# Chapter 3: Mechanical Installation

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## 3-1 Uncrating the Equipment

The large dehumidifying dryers are shipped mounted on a skid, enclosed in a plastic wrapper, and contained in a cardboard box.

1. Pry the crating away from the skid.

**Note:** *Remove the nails holding the box to the skid and lift the box off carefully; avoiding staples in the 1' x 4' wood supports. Cut the steel banding.*

2. Use a pry bar to remove the blocks securing the unit to the skid.
3. Lift unit from sides, inserting forklift under the base. The forks must be equidistant from the centerline of the unit and the unit must be balanced on the forks. Lift slowly and only high enough to clear the skid. Use a pry bar if necessary to carefully remove the skid from the unit.
4. Lower slowly.
5. Remove the temporary hardware that has been installed to prevent the side panels from shifting in transit. Retain the crating material for reshipping the components in case hidden shipping damage is found.

## 3-2 Rigging and Placing Unit

As with all equipment installations, follow all applicable codes and regulations.

- Locate close to the process to reduce piping expense.
- Locate adjacent to drain and city water sources (If equipped with aftercooler).
- Consult a structural engineer to assure that the floor, mounting pad or structural steel support is of adequate strength.
- Allow for required service clearances necessary for maintenance and easy access to all components.

## 3-3 Making Electrical Connections

Refer to local electrical codes, the schematic, and connection diagrams supplied with this unit and the serial tag for wiring considerations. Run all wiring in conduit if codes require it. Label all wiring to make any future troubleshooting easier.

When making electrical connections to your dryer, ensure that you take into consideration and make arrangements for the following:

- ☑ A qualified electrician should make all electrical connections.
- ☑ The serial tag lists voltage, phase, and amp draw information. Line voltage must be within plus or minus ten percent ( $\pm 10\%$ ) of the voltage listed on the serial tag, or damage may occur. Phase imbalance must be less than five percent (5%).
- ☑ Connect main power to the dryer at the disconnect or terminals in the upper right corner of the control enclosure.
- ☑ Install a fused disconnect with a lockout feature in the power main leading to the dryer.

- ☑ The power drop must include a ground wire.
- ☑ Make sure all electrical connections are tight.

### 3-4 Checking for Proper Blower Rotation

After the electrical connections have been made, check the process and regeneration blowers for proper blower rotation. Check blower rotation **before** making process air connections between the dryer and hoppers, and **before** connecting cooling water (for the optional aftercooler).

Blowers should rotate in a clockwise direction. See Figure 7.

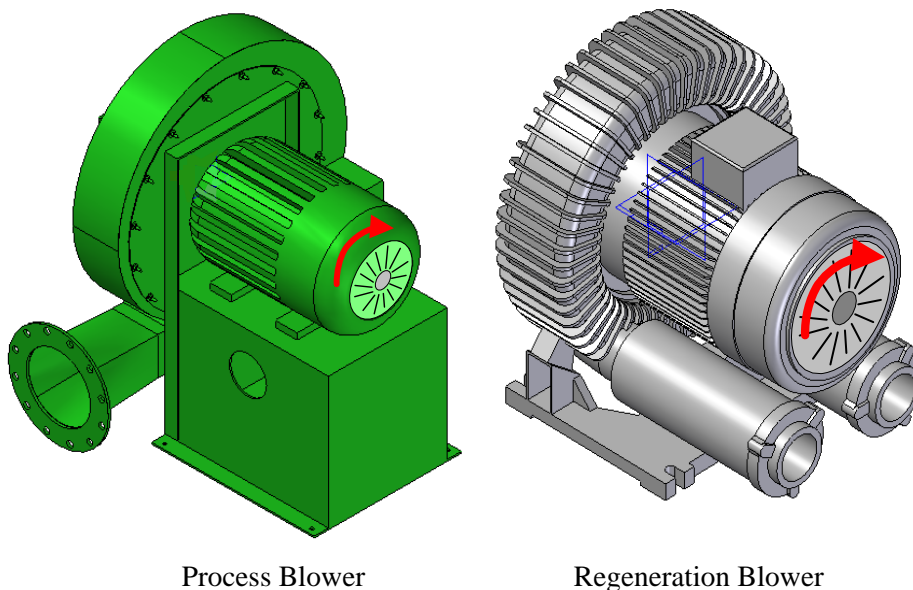
The blowers are rotating properly when air flows from the delivery outlet.

Incorrect phasing of power leads will cause backward rotation of blower motors and contamination of the desiccant.

If both blowers are rotating improperly, reverse any two wires at the fused disconnect outside the dryer or at the disconnect/terminal in the control enclosure. This assures that both blowers will be rotating in the proper direction.

If just one blower is rotating incorrectly, reverse the wires at the motor starters.

**Figure 7: Checking Blower Rotation**

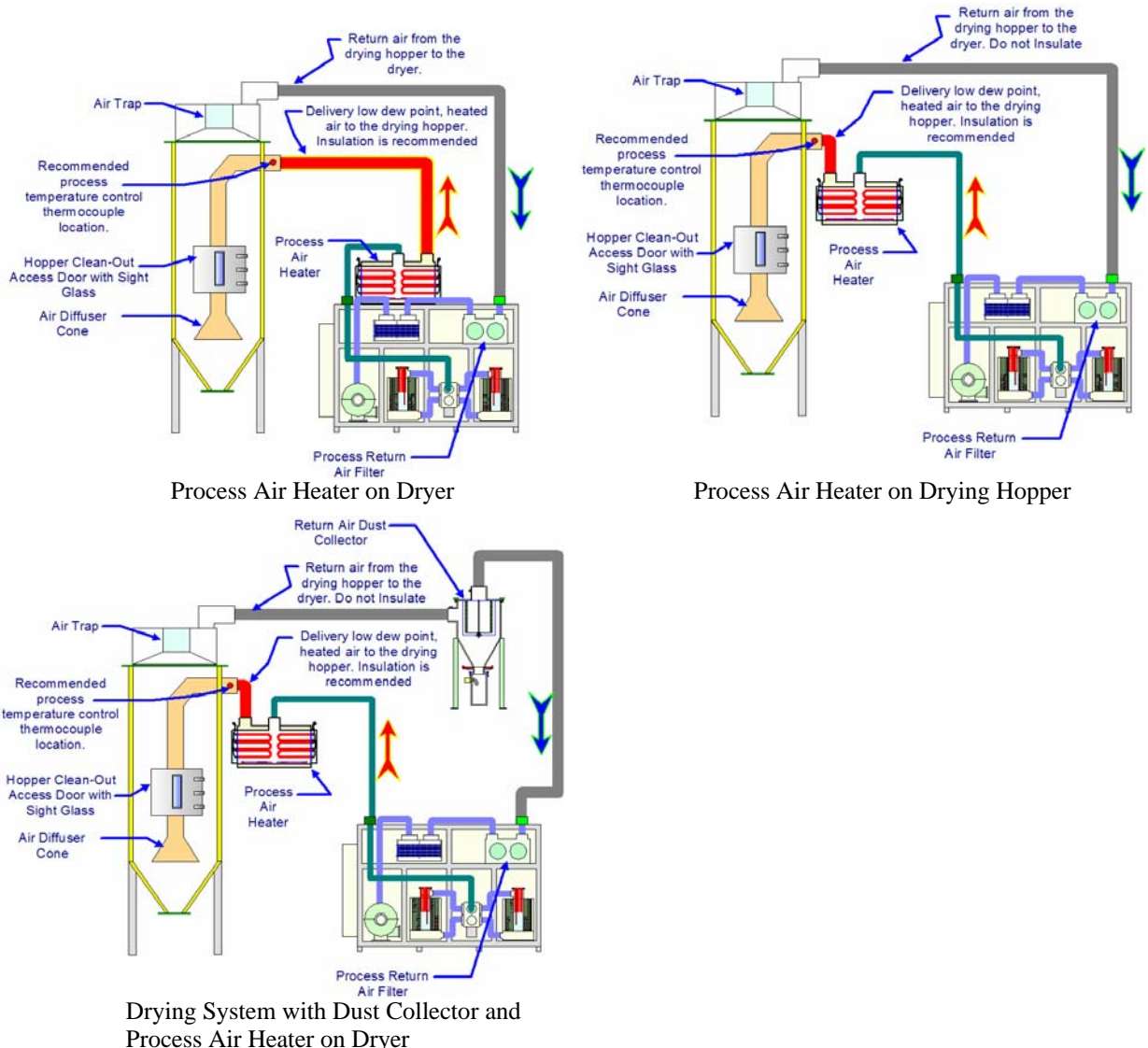


### 3-5 Making Dryer/Drying Hopper Process Air Connections

When making process air connections to your dryer, ensure that you take into consideration and make arrangements for the following:

- ☑ Use high-temperature flexible dryer hose or rigid tubing to connect the dryer to the drying hopper.
- ☑ Keep the delivery (to the drying hopper) hose as short as possible to minimize heat loss. Insulated hose is recommended and available for maximum energy savings.
- ☑ Do not use insulated hose on the return (from the drying hopper)
- ☑ Do not shorten the return hose. The return air to the blower must be 150°F or below.
- ☑ Make sure the hoses are not kinked.
- ☑ Drying hopper air inlet and outlet locations vary, but always connect the hoses so the dry process air from the dryer enters the bottom of the drying hopper and flows out the top to return to the dryer inlet.

**Figure 8: Dryer/Drying Hopper Process Air Connections**



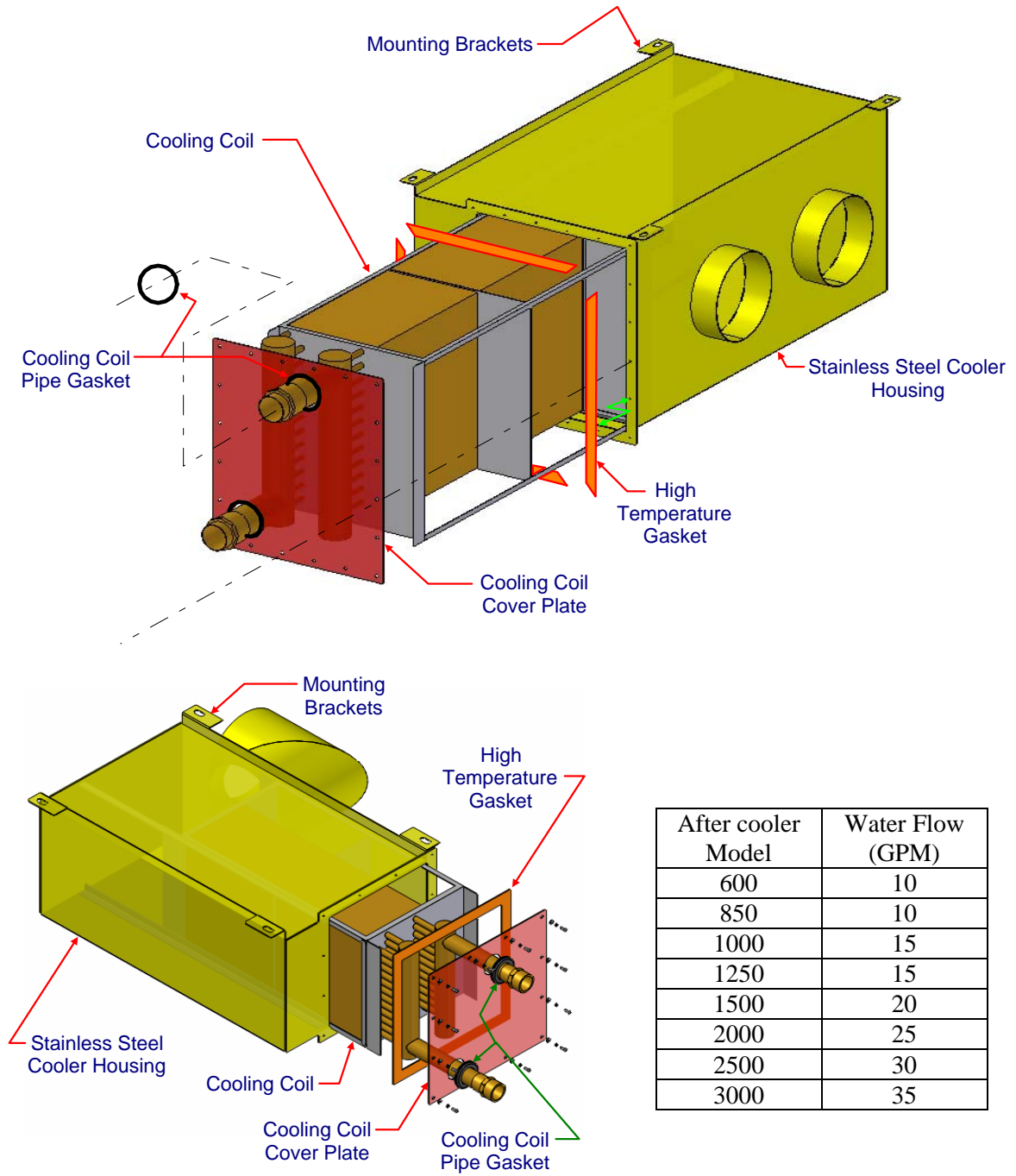


### 3-6 Connecting Aftercooler/Precooler Cooling Water (Optional)

Support both sides of the fitting when making the cooling water connections to prevent damage to the aftercooler coil. See Figure 9.

Connect 85°F water to the inlet closest to the exiting air side of the aftercooler coil. This will cool the process air about 100°F and raise the water-out temperature about 10°F. The table below lists available aftercooler models and their flow rates.

**Figure 9: Aftercooler Components & Flow Rates**

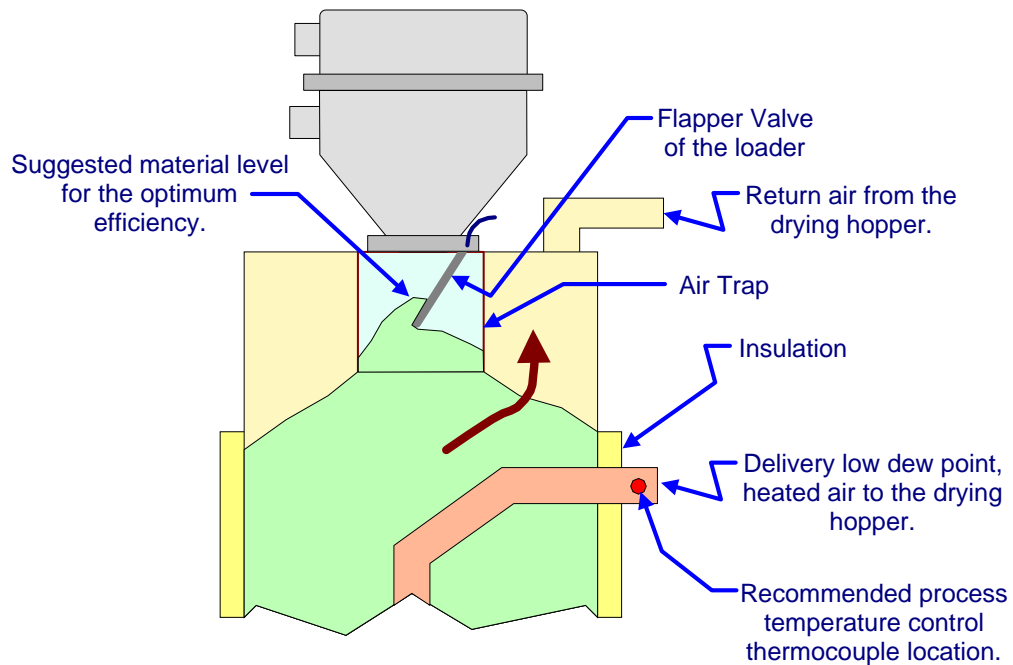


### 3-7 Using the Drying Hopper Air Trap

Our exclusive air trap assembly in the top of the drying hopper prevents ambient air from contaminating the material being dried. To ensure that air does not enter the drying system, do the following (See Figure 10):

- ☑ Keep the material level above the bottom edge of the air trap for maximum efficiency.
- ☑ Use a hopper loader or vacuum conveying system to maintain the proper material level.

**Figure 10: Drying Hopper Air Trap**



# Chapter 4: Controls

## 4-1 Controller Description and Operation

### *Identifying Control Panel Indicator Lights and Switches for the Standard Controller*

#### Switches

**System OFF/ON/START Switch.** This switch energizes or de-energizes control power to the indicator panel and starts the dryer. (The controller can be energized without the dryer running.)

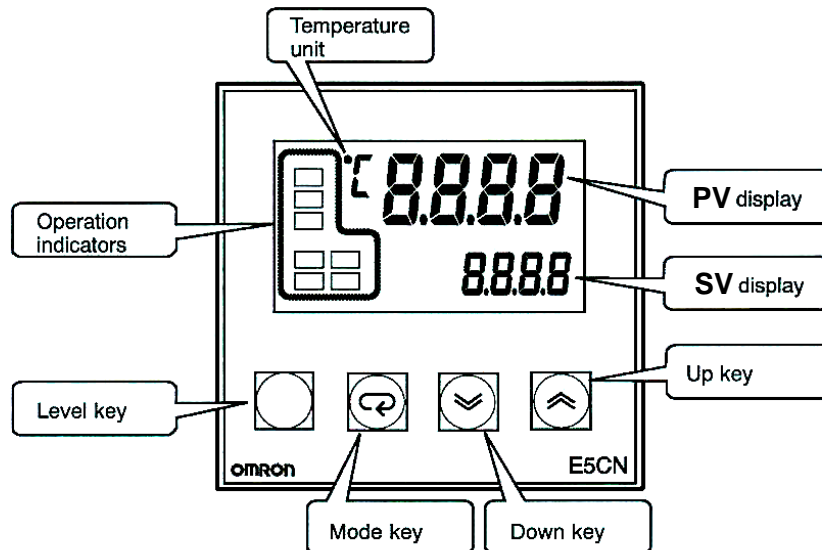
#### Indicator Lights

**Alarm Light.** This feature works in conjunction with the alarm horn to warn the operator of a high bed safety temperature, a regeneration heater fault, or a blower failure. This warning is reset by pressing the alarm silence button.

### *Process Air Temperature Controller*

Our dryers use a microprocessor-based PID temperature controller for maintaining process air temperature. The controller is a modular, self-contained unit that can be removed from the mounting housing. All parameters except for the process air set point are factory set and adjusted; normally, no field adjustment to the internal controls is necessary.

**Figure 11: Typical Process Air Temperature Controller**






### Identifying Process Air Temperature Controller LED Indicators

Indicator	Name	Description
PV 8.8.8.8	Process Value Numeric LED	During normal operation, the process value ( <b>PV</b> ) numeric LED indicator displays the process temperature at the <b>To Process</b> thermocouple. It also lists parameters during setup and error messages if any errors occur.
SV 8.8.8.8	Set Value Numeric LED	During normal operation, the set value ( <b>SV</b> ) numeric LED indicator displays the process set point temperature selected for the dryer. The dryer then maintains this set point temperature. This LED indicator also displays parameter and pre-set function values during configuration setup.
OUT1	Out 1 LED	<b>Lit when Control Output 1 is on.</b> The <b>Out1</b> indicator lights when the controller signals the process heaters to be energized.
OUT2	Out 2 LED	<b>Lit when Control Output 2 is on.</b> Not used in this application.
AT	AT LED	Flashes during auto-tuning in process value (PV) screen.

Indicator	Name	Description
ALARM1	ALARM 1 LED	<b>Lights in the Operation Indicator Section when the output function assigned to auxiliary output 1 turns on.</b> The <b>ALARM1</b> indicator lights when the process temperature falls below the set point temperature by more than the alarm deviation value. Advisory alarm does not interrupt operation of the dryer.

Indicator	Name	Description
ALARM2	ALARM 2 LED	<b>Lights in the Operation Indicator Section when the output function assigned to auxiliary output 1 turns on.</b> The <b>ALARM2</b> indicator lights when the process temperature exceeds the set point temperature by more than the alarm deviation value. Alarm output de-energizes the heaters. Heaters re-energize when the temperature falls within the acceptable range.


### Identifying Temperature Controller Keys


Indicator	Name	Description
	Mode Key	Press the Mode key to shift the display to the next set of parameters. The menu screen displays.
	Down Key	Press the Down arrow key to lower the process air set point temperature. During setup, it lets you decrease the value of the parameter displayed on the set point LED readout.
	Up Key	Press the Up arrow key to raise the process air set point temperature. During setup, it lets you increase the value of the parameter displayed on the set point LED readout.

### Setting the Process Air Temperature

When setting the process air temperature, consult with the resin manufacture for the recommended drying temperature.

To change the process air temperature set point with the dryer running:

Press  to raise the set point to the temperature you want.

Press  to lower the set point to the temperature you want.

### Restoring the Process Air Temperature Controller (E5CN) to Factory Settings

If the preset parameters on the controller have been tampered with and it no longer properly controls temperature and displays dew point, you can restore the controllers to the factory setup. *Call the Service Department for detailed instructions.*

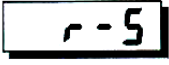
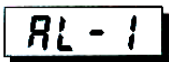
### E5CN Operating Parameters

The E5CN controller has several mode selections. Within each mode are numerous parameters that can be set.

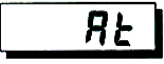




The factory has set the security level to protect the critical parameters from being accidentally changed. Below is an explanation of the operating modes you will have access to and on the following page are the manufacturers' default settings.

## Available E5CN Modes

### Operation Level




Indicator	Name	Description
	Run/Stop Mode (r-S)	When “RUN” is selected, the control is running. When “STOP” is selected, the control is stopped. When the control is stopped, the STOP display lights. The default is set to “RUN.”
	Alarm Value 1 Mode (AL-1)	This setting is used to indicate how many degrees the process temperature will be allowed to exceed the set point temperature. An alarm output will de-energize the heaters.

### Adjustment Level


Indicator	Name	Description
	Auto-Tune Mode (At)	See Page 41 of Chapter 5 for instructions on how to Auto-Tune your dryer.  <b>Note:</b> <i>Although the controller is calibrated at the factory, the manufacturer recommends that the unit be Auto-Tuned prior to dryer startup.</i>
	Temperature Input Shift Mode (TnS)	This setting is used to offset an error between the set point and the actual temperature. The entire input range is shifted by a set figure preprogrammed by the operator.
	Proportional Band Mode (P)	This setting controls the amount in which the manipulated variable (MV) is proportionate to the deviated value or controller error.
	Integral Time Mode (I)	Setting this feature, gives the control an action that is proportionate to the time integral of the control error. By using this setting, proportional action is used in combination with integral action to offset the control error and the set point will begin to match the control temperature (PV or process value).
	Derivative Time Mode (d)	Setting the derivative control provides the controller with the ability to correct for a future error in the previously set process output.

## Entering Operating Parameters to Select Modes

To enter the display:

1. Press the  Mode Display key to view the Run/Stop & Alarm 1 Modes.
2. Press  and  to set the higher or lower the values of the parameter or turn that function On or Off.




The **SV** readout displays the different values for the parameter within a mode.

3. To switch modes within a level, press and hold the  Level Display key for one (1) second.

The **PV** readout will display the different parameters within each mode.

4. Use short presses on the  Mode Display key to display each parameter within a mode.

The **SV** readout displays the different values for the parameter within a mode.

5. Press  and  to set the higher or lower the values of a parameter or turn that function On or Off.
6. Press  Level Key once to return to the Process Temperature Setting.

**Figure 12: Settings for Process Temperature Controller (E5CN), Part No. A0555757**

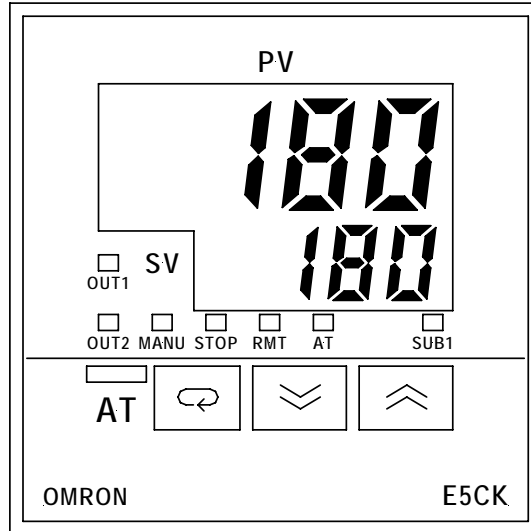
Mode	Parameter	Setting range	Default	Manuf. setting
Operation	Run/Stop	Run/Stop	Run	-
	Alarm value 1	-1999 to 9999	0	25
Mode	Parameter	Setting range	Default	Manuf. setting
Adjustment	AT execute/cancel	ON, OFF	OFF	?
	Temperature input shift	-199.9 to 999.9	0.0	-
	Proportional Band	0.1 to 999.9	8.0	?
	Integral Time	0 to 3999	233	?
	Derivative Time	0 to 3999	40	?

## Process Air Dew Point Display

### Optional

The Process Air Dew Point meter indicates the current process air delivery moisture content. Standard dryers use a microprocessor-based controller for displaying dew point air temperature. The controller is a modular, self-contained unit removable from the mounting housing. All parameters are factory set and adjusted; normally, no field adjustment to the internal controls are necessary.

**Figure 13: Typical Dew Point Display Monitor**



**Note:** The only functional buttons on this controller are the up and down keys.

### Setting the High Dew Point Alarm

The high dew point alarm setting is changed by pressing the up and down keys to input the alarm value. The factory setting for Alarm Value 1 (**AL-1**) is -10°F (-23°C).

### Restoring the Process Air Dew Point Meter (E5CK) to Factory Setup

If the preset parameters on the controller have been tampered with and it no longer functions properly, call the Service Department. *This controller is not meant to be modified.*

**Note:** The dew point alarm monitors and indicates a deviation from the set point.

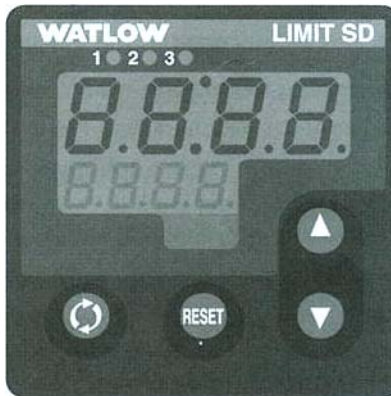


## **Redundant Safety Controller Display**

### **Optional**

The Redundant Safety Controller limits the process air temperature from exceeding the upper temperature range set by the E5CN Temperature Controller. Standard dryers use a microprocessor-based controller for limiting the process air temperature. The controller is a modular, self-contained unit removable from the mounting housing. All parameters are factory set and adjusted; normally, no field adjustment to the internal controls are necessary.

**Figure 14: Typical Redundant Safety Controller Display**



### **Setting the Redundant Safety Controller**

The Redundant Safety Controller alarm setting is changed by pressing the up and down keys to input the alarm value. The upper display reading indicates the Process Value, while the lower display indicates the High Point Setting alarm value. The factory setting for the High Point Alarm Value (***LI-hi***) is 150°F (-23°C).

### **Restoring the WATLOW Redundant Safety Controller to Factory Setup**

If the preset parameters on the controller have been tampered with and it no longer functions properly, call the Service Department. ***This controller is not meant to be modified.***






### **WATLOW Operating Parameters**

The WATLOW controller has only one mode selection; ALARM.

The factory sets the security level to protect the critical parameters from being accidentally changed. Below is an explanation of the modes you will have access to and the manufacturer default settings.

## Entering Operating Parameters to Select Modes

To enter the display:

1. Press both the Up  and Down  keys for three seconds from the home page. The word **SEE** will appear in the upper display and **PAGE** will appear in the lower display.
2. Press the Advance Key  to move through the parameter prompts.
3. Press the Up  or Down  keys to change the parameter value.
4. Press the **RESET** Key at any time to return to the Home Page display.

**Figure 15: Setting List for Redundant Safety Controller (WATLOW), Part No. A0555757**

Mode	Parameter	Setting range	Default	Manf. setting
SEn	Sensor Type	0-3	0	-
Lin	Thermocouple Linearization	0-10	0	H (1)
C-F	Temperature Units	Fahrenheit / Celsius	F	-
S.dEC	Temp. Decimal Places	0 – 0.0	0	-
IS.En	INFOSENSE™	Yes / No	No	-
Sc.Lo	Process Scale Low	4.00 to 20.00 mA 1.00 to 10.00V	4.00 mA 1.00V	0
Sc.hi	Process Scale High	4.00 to 20.00 mA 1.00 to 10.00V	20.00 mA 5.00 V	400
CAL	Calibration Offset	-999 to 999	0	-
Ftr.E	Input Filter	Off, DiSP, Cont, both	OFF	-
Ot 1	Output 1 Function	Limit (2)	(2)	-
LSd1	Output 1 Limit Sides	Both, High, Low	Both	High
hyS1	Limit 1 Hysteresis	0.0 to 999.0	1.0	-
Ot2	Output 2 Function	Off / Process Alarm / Limit (2)	OFF	-
LSd2	Output 2 Sides	Both / high / low	Both	-
UdSP	Upper Display Look	None, Process Value, Limit 1 Low Set, Limit 1 High Set, Limit 2 Low Set, Limit 2 High Set, Alarm 2 Low Set, Alarm 2 High Set, Limit 3 Low Set, Limit 3 High Set, Alarm 3 Low Set, Alarm 3 High Set	Process	-
LdSP	Lower Display Look	None, Process Value, Limit 1 Low Set, Limit 1 High Set, Limit 2 Low Set, Limit 2 High Set, Alarm 2 Low Set, Alarm 2 High Set, Limit 3 Low Set, Limit 3 High Set, Alarm 3 Low Set, Alarm 3 High Set	Limit 1 High Set	-
LOC	Lockout	(0) no lockout, (1) Programming and Setup Page Locked, (2) Limit Set Points are the only Operation Page parameters accessible, (3) Full Lockout.	0	2

# Chapter 5: Operation

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## 5-1 Initial Start-up

### *Pre-Startup Checks*

- ☑ Check the process and return hoses for tight connections.
- ☑ Check all companion equipment, such as the drying hopper; verify that the loading system is ready for operation.
- ☑ Verify that all dryer electrical connections are tight.

### *Auto-Tuning the Dryer*

1. For Auto-tuning, press the beige button once. The AT screen will show with the setting **OFF**.
2. Press the UP arrow to change the setting to **ON**.
3. Press the beige button again to go back to the Temperature Screen. Your actual temperature will start to flash for about 10-20 minutes with the temperature fluctuating up and down during that period. After the flashing stops, it means auto-tuning has finished.

### *Shutting Down the Dryer*

1. Turn off the conveying system supplying the drying hopper.
2. When processing is complete, close the hopper slide gate and shut down any in-line companion equipment, such as the aftercooler.
3. Turn the Dryer **OFF/ON/START** selector switch to **OFF**.
4. Turn the system's disconnect switch to **OFF**.
5. If needed, empty the drying hopper.
6. For maintenance or a long term shutdown, open (de-energize) the electrical disconnects at the dryer and at the power drop.

## 5-2 Dryer Operation Procedures

### **Controller Operation (Without Optional Alarm Horn & Reset Button)**

1. Turn the disconnect on the control panel to the **ON** position. Power is applied to the voltage line fuses, line side of the control power switch and the temperature controller.
2. Turn the control power switch to the **ON** position. Power is applied to the programmable relay and dew point controller. The valve will move to the start position as follows:
  - a. The bed switch valve motor rotates until the cam switch makes 2 transitions.
  - b. If the cam switch does not make a transition within 10 seconds, a valve motor fault is generated. “**VM**” is displayed on the relay screen, the alarm light is activated. The valve motor, heaters, and blower shut off.  
  
To restart the dryer, cycle control power to deactivate the alarm light and restart the valve motor sequence.

**Note:** *The relay screen which contains the Alarm Display Messages is located inside the controller enclosure. For a list of Alarm Display Messages, see Page 39.*

#### **WARNING!**



*Do not attempt to check the Alarms on the Controller located within the unit enclosure unless you are a qualified electrician!*

- c. The valve will normally complete one full cycle (revolution).  
  
If the drying process shuts down due to an alarm, the dryer has been setup to have the following operational features:
    - The bed in process at power-down will remain in process.
    - The bed in regeneration at power-down will remain in regeneration.
    - The regeneration timing cycle will restart from the beginning.
3. Once the control power is on and no fault conditions exist, turning the **OFF-ON-START** switch to the **START** position will start the dryer as follows:
  - a. The process heater is turned on and controlled by the E5CN controller.
  - b. The process & regen blowers are started.
  - c. The regen heater is turned on and the regeneration timing sequence is initiated. The regen heater is controlled by the E5CN controller. For default timing settings for regeneration, see the table below.
4. If either the left or right bed safety temperature switch opens, a regen heater fault is generated. “**RS**” is displayed on the relay screen. The alarm light is activated. The process heater, regen heater, and process/regen blowers are turned off.  
  
Turn the **OFF-ON-START** switch to the **START** position to deactivate the alarm light and restart the dryer. If either switch is still open, the dryer will not restart.

5. If the Regen E5CN controller faults, a regen high heat fault is generated. “**RH**” is displayed on the relay screen. The alarm light is activated. The process heater, regen heater, and process/regen blower are turned off.

Turn the **OFF-ON-START** switch to the **START** position to deactivate the alarm light and restart the dryer. If the fault condition still exists, the dryer will not restart.

6. If the process regen overload trips, a regen blower fault is generated. “**RB**” is displayed on the relay screen. The alarm light is activated. The process heater, regen heater, and process & regen blowers are turned off.

Reset the motor overload and turn the **OFF-ON-START** switch to the **START** position to deactivate the alarm light and restart the dryer.

7. If the process heater safety temperature switch opens, a process heater fault is generated. “**PS**” is displayed on the relay screen. The alarm light is activated. The process heater, regen heater, and process/regen blowers are turned off.

Turn the **OFF-ON-START** switch to the **START** position to deactivate the alarm light and restart the dryer. If the switch is still open, the dryer will not restart.

8. If the Process E5CN controller faults, a process high heat fault is generated. “**PH**” is displayed on the relay screen. The alarm light is activated. The process heater, regen heater, and process/regen blower are turned off.

Turn the **OFF-ON-START** switch to the **START** position to deactivate the alarm light and restart the dryer. If the fault condition still exists, the dryer will not restart.

9. If the optional redundant high temperature safety device faults, a redundant safety fault is generated. “**PR**” is displayed on the relay screen. The alarm light is activated. The process heater, regen heater, and process/regen blower are turned off.

Turn the **OFF-ON-START** switch to the **START** position to deactivate the alarm light and restart the dryer. If the fault condition still exists, the dryer will not restart.

10. If the process blower overload trips, a process blower fault is generated. “**PB**” is displayed on the relay screen. The alarm light is activated. The process heater, regen heater, and process & regen blowers are turned off.

Reset the motor overload and turn the **OFF-ON-START** switch to the **START** position to deactivate the alarm light and restart the dryer.

11. The valve position limit switch enables the right bed heater and provides an input signal to the programmable relay when actuated by the cam lobe. When the cam lobe position is high, the right bed is activated. When the cam lobe position is low, the left bed is activated. Each heater is **ON-OFF** controlled by the regen E5CN controller.

12. Upon completion of the HEAT portion of the regeneration sequence, the regen heaters are disabled by the programmable relay and the COOL time begins.

13. Once the Cool time has expired, the valve motor is turned on until the cam switch makes a transition. Upon making a transition, the timing sequence is restarted for the new bed. If the valve or switch malfunctions, a bed switch fault is generated. “**BV**” is displayed on the relay screen. Contact the service department for assistance

14. When a dew point fault is generated by the dew point controller, the alarm light will activate. The alarm light will flash, indicating a non-critical fault. “**DP**” is displayed

on the relay screen. Press ALARM RESET to deactivate the alarm until the next dew point fault occurs.

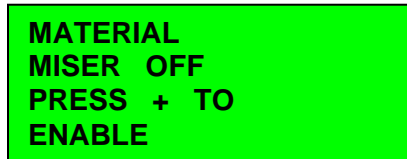
15. Use the right arrow key to display the REGEN SET screen (Screen 1). Use the up & down arrow keys to select the parameter to change. Use the + & - keys to change the parameter value. Press the **OK** key to accept and store the changed values. Press **ESC** to cancel changes.



REGEN  
SET  
HEAT 45  
COOL 20

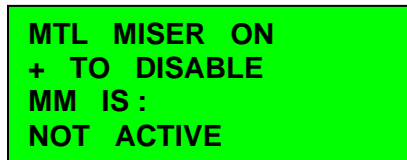
Screen 1.

16. Use the right arrow key to display the Material Miser screen. Use the + key to enable/disable this feature. See Screens 2 & 3.



MATERIAL  
MISER OFF  
PRESS + TO  
ENABLE

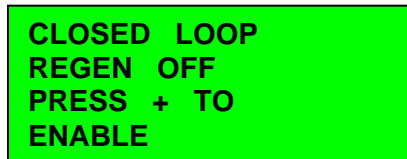
Screen 2.



MTL MISER ON  
+ TO DISABLE  
MM IS :  
NOT ACTIVE

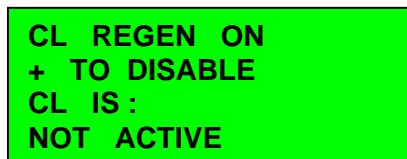
Screen 3.

17. Use the right arrow key to display the Closed Loop Regen screen. Use the + key to enable / disable this feature. See Screens 4 & 5.



CLOSED LOOP  
REGEN OFF  
PRESS + TO  
ENABLE

Screen 4.



CL REGEN ON  
+ TO DISABLE  
CL IS :  
NOT ACTIVE

Screen 5.

18. Turn selector switch to **START** position to start the dryer. The bed switch valve will cycle to a known good position. The process & regen blowers will start. Process & Regen heaters are enabled. A new regen heat/cool cycle is started. Blower alarms are enabled 5 seconds after startup. Dew Point alarm is enabled 5 minutes after startup. All other alarms are enabled with no delay.
  
19. Material Miser. When this feature is enabled, the panel light will illuminate and the screen will display 'ACTIVE' when airflow is reduced to the drying hopper. When airflow to the hopper is normal, the light is extinguished and the screen reads "INACTIVE".
  
20. Closed Loop Regeneration. When this feature is enabled, the screen will display 'ACTIVE' when regen airflow is in closed loop (cooling). When regen airflow is normal, the screen reads "INACTIVE".
  
21. The dryer is shut off by turning the control power switch to the **OFF** position.

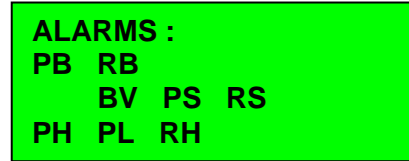
### 5-3 Alarm Display Messages

**Note:** *The relay screen which contains the Alarm Display Messages is located inside the controller enclosure and may be seen through the window on the front of the control box.*

1. Non-critical alarms. The following alarms are con-critical and will NOT shut down the dryer:
  - a. Dew Point.
  - b. Process / Regen Dirty Filter.
  - c. Process heat low temp alarm.
  - d. Closed Loop Valve Motor fault.
  
2. Critical alarms. The following alarms are critical and WILL shut down the dryer. Alarms are silenced by turning the Off/On/Start switch to the start position. The dryer will restart if the alarm condition is no longer present.
  - a. Process blower fault.
  - b. Regen blower fault.
  - c. Process heater high temp switch.
  - d. Regen heater high temp switches.
  - e. Regen valve motor fault.
  - f. Process high temp alarm (TCU).
  - g. Regen high temp alarm (TCU).
  - h. Redundant safety alarm.
  
3. Viewing alarm codes. See Screen 6. The alarm screen is displayed any time an alarm is active, and can also be accessed by pressing the right arrow key. Each alarm is assigned a 2 letter code as follows:

ALARM CODES:  
 PB - PROCESS BLOWER  
 RB - REGEN BLOWER

PF - PROCESS FILTER  
RF - REGEN FILTER  
CV - CLOSED LOOP VALVE  
BV - BED SWITCH VALVE  
PS - PROCESS TEMP SWITCH  
RS - REGEN TEMP SWITCH  
PH - PROCESS HI TEMP  
PL - PROCESS LOW TEMP  
RH - REGEN HI TEMP  
DP - DEWPOINT  
PR - REDUNDANT SAFETY



**ALARMS :**  
**PB RB**  
**BV PS RS**  
**PH PL RH**

Screen 6.

#### 5-4 Auto-Tuning the Dryer

1. For Auto-tuning, press the beige button once. The AT screen will show with the setting **OFF**.
2. Press the UP arrow to change the setting to **ON**.
3. Press the beige button again to go back to the Temperature Screen. Your actual temperature will start to flash for about 10-20 minutes with the temperature fluctuating up and down during that period. After the flashing stops, it means auto-tuning has finished.

#### 5-5 Shutting Down the Dryer

1. Turn off the conveying system supplying the drying hopper.
2. When processing is complete, close the hopper slide gate and shut down any in-line companion equipment, such as the aftercooler.
3. Turn the Dryer **OFF/ON/START** selector switch to **OFF**.
4. Turn the system **ON/OFF** switch to **OFF**.
5. If needed, empty the drying hopper.
6. For maintenance or a long term shutdown, open (de-energize) the electrical disconnects at the dryer and at the power drop.



# Chapter 6: Maintenance

## 6-1 Maintenance Schedule

The checklist below contains a list of items that should be inspected and/or replaced to keep your Large Dehumidifying Dryer operating at peak efficiency. Perform each inspection at the regular intervals listed below.

Dryer Model #	Serial #
---------------	----------

EVERY WEEK	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By
Inspect all filters for wear, replace/clean if dirty or worn													

EVERY MONTH	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lock out electrical power and inspect electrical wiring for integrity												
Lock out electrical power and check heater elements for continuity using an ohmmeter												
Check Dew point and temperature tracking with an external dew point monitor and pyrometer												
Visually inspect the shifting of the airflow valve during one cycle												

EVERY YEAR	Next Scheduled Inspection	Actual Inspection Date/By	Next Scheduled Inspection	Actual Inspection Date/By
Inspect desiccant. Replace if brown or broken				

**- Photocopy this page for your maintenance records -**

## 6-2 Preventative Maintenance

### ***Cleaning or Replacing the Process Air Filters***

Regular filter cleaning will keep your dryer operating at peak efficiency. The process air filters protect the centrifugal blowers from plastic fines being drawn in from the drying hopper. Filters should be cleaned when airflow restriction trips the dirty filter alarm. Filters should be replaced at least once a year.

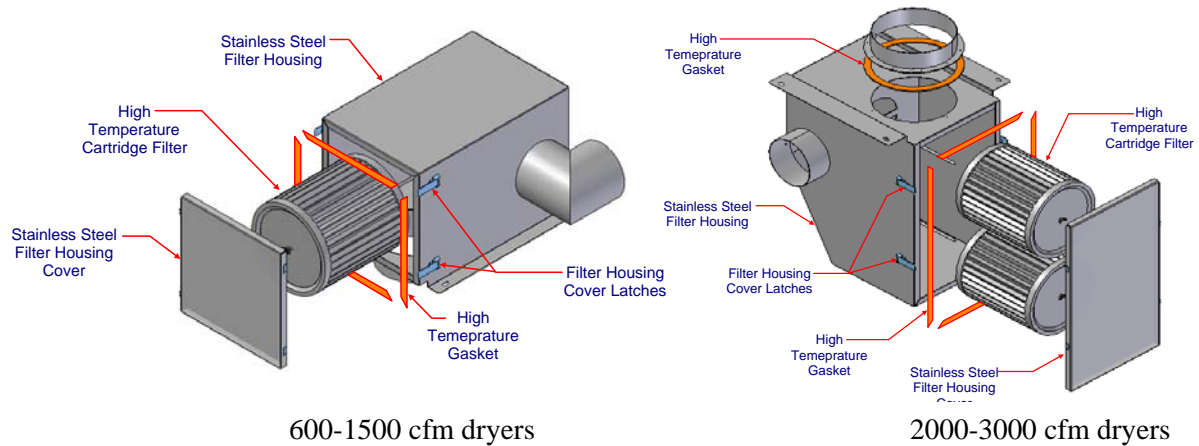
**Caution!** *Operating the dryer without the process air filters installed will void the warranty.*

On 600-1500 cfm dryers, there is a single high-temperature (up to 350°F) filter mounted above the process blower on the rear of the dryer. On 2000-3000 cfm dryers, there are two high-temperature (up to 350°F) filters located in the housing under the blower platform on the left rear corner of the dryer.

**Vacuuming.** Vacuum cleaning is the preferred method for cleaning the process air filters because compressed air or high-pressure washing can damage the filter. Vacuuming removes most large particles and surface contaminant. Use a commercial duty vacuum cleaner and vacuum the filter from the air intake (dirty) side only.

**Compressed Air Cleaning.** Blow clean, dry compressed air up and down the pleats, blowing out the filter from the clean side. Do not shoot the air in a criss-cross motion against the grain of the pleats—this won't clean the filter, and it may damage it. Compressed air should be less than 100 psi—use a 1/8 diameter nozzle at least 2 inches away from the filter.

**Figure 16: Process Filter Housing**



Use the following procedure to clean or replace the filter cartridges:

1. Turn off and/or lock out electrical power to the dryer.
2. Remove the hand knobs or clamps securing the filter access cover and remove the cover.
3. Remove the nut on the center-retaining rod to remove a filter cartridge.
4. Vacuum, blow out, or wash the filter.
5. Inspect the filter - a damaged filter should not be reused. Check the following:
  - Hold a light bulb behind the filter element to find holes, tears, fatigued paper or residual dirt.
  - Inspect the end plates—damage here could allow air to bypass the filter.
  - Look for rust on the end plates and metal core—rust particles could flake off and contaminate the dryer and resin.
  - Check the gasket for damage—a damaged gasket will allow contaminants into the process. Replace if needed.
6. Return the filter cartridge to its original position and tighten the nut on the center-retaining rod to secure the filter cartridge.
7. Secure the filter access cover with the hand knobs or threaded fasteners.

### ***Cleaning or Replacing the Regeneration Filter***

Large dryers are equipped with a filter in the regeneration air loop located at the back of the dryer. Regular filter cleaning will keep your dryer operating at peak efficiency.

**Caution!**      *Operating the dryer without the regeneration air filters installed will void the warranty.*

1. Turn off and/or lock out electrical power to the dryer.
2. Remove the knob securing the filter.
3. Remove the filter from the post.
4. Vacuum or carefully blow out the filter with compressed air. If the filter is worn or can't be cleaned, replace it.
5. Slide the filter back onto its post and tighten knob back on the filter.

### ***Calibrating the Dirty Filter Alarm***

Your dryer may be equipped with a Dirty Filter alarm. When the alarm sounds, it is time to clean or change the filter. The Dirty Filter alarm is tested and calibrated at the factory, but it can be adjusted in the field. Be sure that your filter is clean, and use the following procedure to calibrate the alarm.

1. Remove the process air return filter element from its housing.
2. Block off approximately 50% of the filter's surface area to simulate a dirty filter.
3. Reinstall the cartridge and secure the cover.
4. While the process blower is operating, adjust the trim screw on the differential pressure switch until the alarm light just comes on.

5. Remove the restricted filter cartridge from the housing again. The alarm light should stay off when the process blower operates if the switch is adjusted correctly.
6. Re-install the obstructed cartridge filter. The alarm light should go on again if the switch is adjusted correctly.
7. Fine tune the switch setting so it consistently warns of a blocked filter and does not falsely indicate a blockage of a clean filter.
8. Remove the restriction from the filter element and re-install the clean filter. The alarm light should remain off.

### ***Checking the Dewpoint Control System***

The Dewpoint Switch option on dryers depends on the proper operation of the dewpoint sensor and its control board. The dewpoint sensor is in the process air stream and is therefore susceptible to contamination.

Dewpoint sensor life is dependent on:

- Air temperature and flow passing over the sensor.
- The amount of fines [dust] in the process air.
- The amount of plasticizer vapor in the process air.

The dryer operator should monitor the initial dewpoint sensor readings and establish a periodic replacement schedule as needed.

***Caution!*** *Do not attempt to check the continuity or resistance of a dewpoint sensor. The sensor will be destroyed.*

If you suspect that the dewpoint readings on the dewpoint meter are incorrect, a dewpoint simulation calibrator is available from the manufacturer [part number A0549143]. This device simulates various dewpoint outputs. It can confirm proper operation of the dewpoint sensor and dewpoint system control board.

Use the following procedure to check the dewpoint sensor and dewpoint control board:

1. Remove the sensor cable from the sensor hex nut adapter.
2. Connect the cable to the plug on the rear of the simulator.
3. Turn the rotary knob on the simulator to each position and note the readings on the dewpoint meter on the dryer's control panel. The readings should correspond within a degree or two across the entire range.
4. If the readings agree, the control board is OK. Dewpoint sensor replacement is recommended. If the readings do not agree, replace the control board and run the test again to rule out the possibility of a bad sensor.

***Note:*** *Do not attempt to make any adjustments to the components on the dewpoint control board.*

5. When testing is finished, re-connect the control cable to the sensor adapter.

## 6-3 Corrective Maintenance

### ***Symptoms of Worn Out Desiccant***

The moisture adsorption capacity of the desiccant used in Large Dehumidifying Dryers degrades after an indefinite period of time. Useful life depends on variables such as material moisture content, plasticizer vapors in the return air and number of regeneration cycles.

Your dryer may need new desiccant if it exhibits any of the following symptoms:

- The plastic material is not being dried sufficiently (high scrap/reject rate).
- The air temperature at the top of the regenerating desiccant bed rapidly climbs to 350°F or more shortly after the start of regeneration, even though a saturated bed has just started heating.
- The process air dewpoint, measured with a portable dewpoint monitor, is higher than -10°F throughout the process drying cycle.
- Smoke or dust is being blown out of the process air outlet.
- Noticeable amounts of desiccant in the beds is a medium-brown color, or darker.

If any of these signs are noticed, the desiccant in the desiccant beds should be replaced. Desiccant replacement kits are available from the Parts Department. If you wish, the desiccant beds can be repacked at your site by a service technician.

***WARNING! DESICCANT MATERIAL CAUSES EYE IRRITATION  
BREATHING MAY BE HARMFUL/MAY CAUSE SKIN IRRITATION!***

- *Do not get in eyes.*
- *Avoid prolonged contact with skin.*
- *Use with adequate ventilation.*
- *Wash thoroughly after handling.*

### **FIRST AID:**

**In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. If irritation persists, see a physician.**

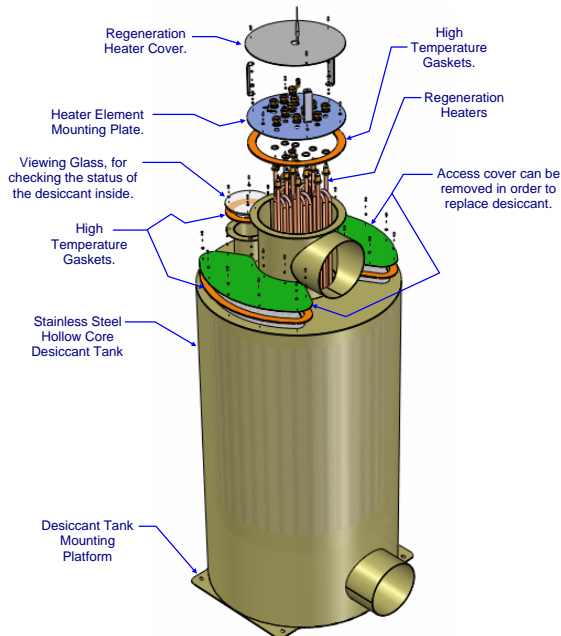
### ***Replacing the Desiccant***

Follow the procedure below to change the desiccant. See Figure 17 below for desiccant tower components.

1. Disconnect electrical power to the dryer.
2. Remove the bolts and nuts securing the covers of each desiccant canister. Remove the covers and set them aside.
3. With a shop vacuum that has a 4 micron HEPA filter, carefully remove all desiccant from each tower.
4. Inspect all screens for tears or burn-through spots.
5. Fill each canister with 13X, 8 x 12 bead desiccant.

6. Inspect the gaskets on each of the covers. Replace if necessary.
7. Re-install the covers.

**Figure 17: Desiccant Tower Assembly**



**Figure 18: Desiccant Replacement Amounts**

Dryer CFM	Desiccant Required per Tower	
	"13 X", 8 x 12 Bead	Total
600	175	350
850	175	350
1000	300	600
1250	300	600
1500	300	600
2000	300	1200
2500	300	1200
3000	300	1200

***Replacing the Process Heater (Electric Dryers)***

Large Dryers have a number of single phase Calrod-type heater elements wired in a delta formation. They are mounted on top of the dryer or to the drying hopper. The number and wattage of the heaters varies with model, voltage, temperature range, etc., but the replacement procedure is the same.

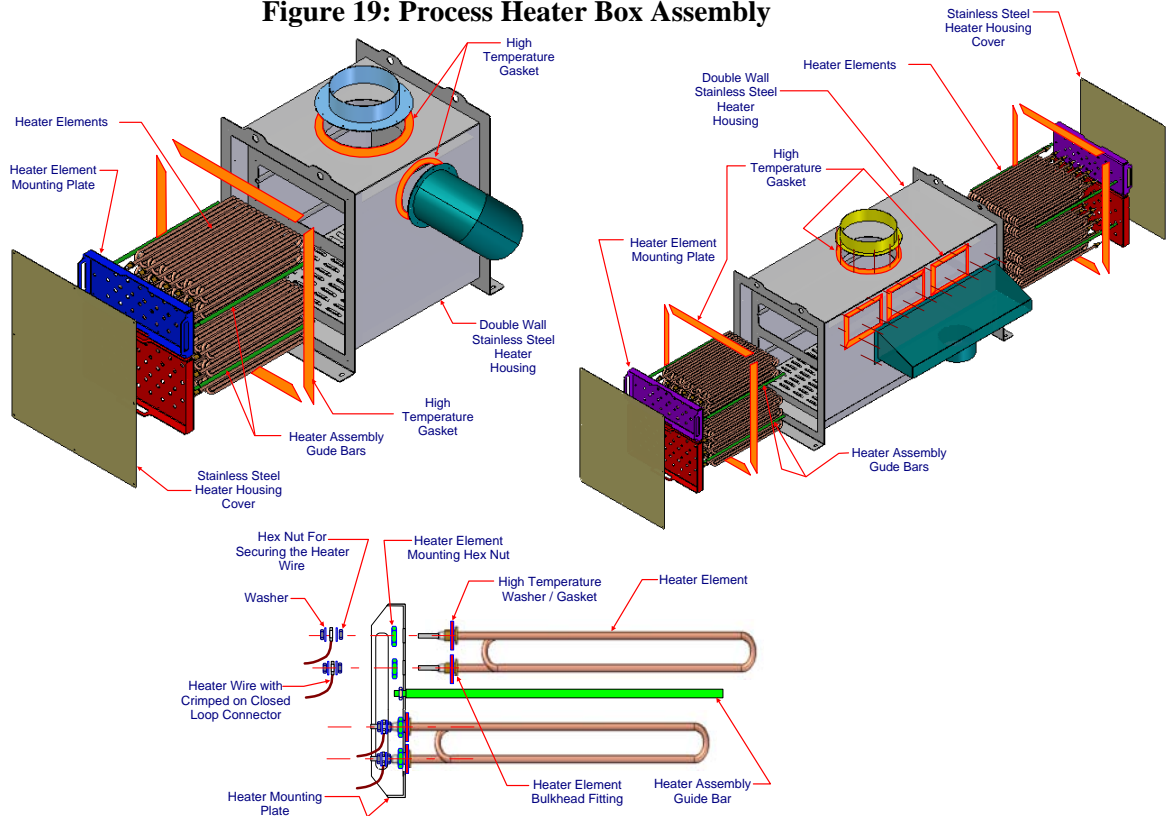
***DANGER!*** *Disconnect and lock out power before heater replacement.*

1. Remove the bolts securing the process heater access cover.
2. Sketch the heater wiring configuration so the heaters may be re-wired properly. Heaters are mounted on a common plate of three or six for easy maintenance.
3. Remove the jumper bars and wires for the heater plate assembly(ies) being removed or replaced.
4. Remove the bolts securing the heater plate assembly and slide out the assembly. Avoid damaging the gaskets.
5. Remove individual heaters for replacement by removing the large brass nuts and washers.
6. Re-install the heaters and heater plate assemblies in reverse order, replacing gaskets if necessary.

**Caution!** *Heater loops should not touch each other. "Hot spots" will lead to premature heater failure.*

7. Re-install the jumper wires and bars according to the sketch made earlier.
8. Re-secure the process heater access cover.

**Figure 19: Process Heater Box Assembly**



### **Replacing the Regeneration Heater (Electric Dryers)**

The regeneration heaters are wired in the delta formation, mounted in the core of the descant tanks.

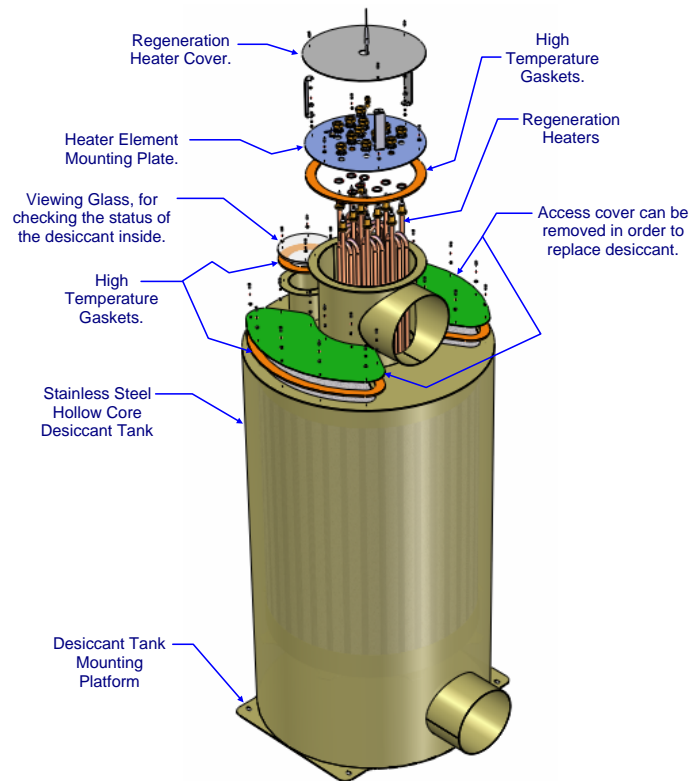
**DANGER!** *Disconnect and lock out power before heater replacement.*

1. Access the desiccant canisters by removing the panels on the dryer.
2. Remove the Regeneration Heater Cover.
3. Unscrew the six (6) screws on the Heater Element Mounting Plate.
4. Slide out the heater assembly, taking care to not damage the gaskets.
5. Unscrew the heater loops that need to be replaced.
6. Re-install the new heaters. Securely tighten all fasteners.

**Caution!**      *The heater loops should not touch each other. This will create "hot spots" and lead to premature heater failure.*

7. Insert the heater assembly back into the desiccant canister.
8. Fasten the six (6) screws on the Heater Element Mounting Plate.
9. Re-secure the Regeneration Heater Cover.
10. Re-install the dryer panels.

**Figure 20: Regeneration Heater Box Assembly**





# Chapter 7: Troubleshooting

## 7-1 Introduction

The utmost in safety precautions should be observed at all times when working on or around the machine and the electrical components. All normal trouble-shooting must be accomplished with the power off, line fuses removed, and with the machine tagged as out of service.

Before making haphazard substitutions and repairs when defective electrical components are malfunctioning, we recommend that you check the associated circuitry and assemblies for other defective devices. It is common to replace the obviously damaged component without actually locating the real cause of the trouble. Such hasty substitutions will only destroy the new component. Refer to wiring diagrams and schematics.

## 7-2 Basic Troubleshooting

Problem	Possible Cause	Corrective Action
Little or no air coming from process delivery tube.	Dirty Filters	Clean or replace filters.
	Desiccant beds contaminated by material or plasticizer leaking into the system.	Replace desiccant See page 46.
	Blower fuse(s) blown.	Fix problem and Replace fuse(s).
	Overload tripped.	Fix problem and reset the overload.
	Blower fins filled with dust or contaminants.	Remove blower side plate, clean baffles, replace.
Suction in delivery tube, pressure from the return tube.	Phase is reversed on power drop coming into the dryer.	<b>Stop the Dryer.</b> If the dryer was connected to the drying hopper, check to see if the desiccant and process air heater has been contaminated with resin. If so, replace the desiccant and remove any resin carry-over. Otherwise, change the phase of two legs of the three-phase power drop. Never change the phase at the motor starters unless only one of the two blowers is rotating improperly.
Loss or reduction of process air temperature.	Process heaters are faulty.	Check for open or shorted heaters. Replace if required. Check the fuses.
	Solid-state temperature controller faulty.	Replace.
	Process temperature was adjusted in error by plant personnel.	Make sure that plant personnel are aware of the proper temperature set point. A sign posted next to the control would be helpful.

<b>Problem</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Loss or reduction in drying capacity.	Process heaters are faulty.	Replace.
	Desiccant beds are contaminated.	Replace desiccant.
	Material being dried differs from material specified at the time of purchase.	Drying systems are designed for the material that was originally specified. Different materials may need a longer residence time or different drying temperature.
	Break in flex hose to/from drying hopper.	Inspect for air leaks; replace if necessary.
	Blower fins filled with dust or contaminants.	Remove blower side plate, clean baffles, replace. Replace filter elements.
Material in drying hopper cakes, or meltdown occurs.	Process temperature set too high due to operator error.	Check resin manufacturer's data sheet for proper drying temperature. Make sure plant personnel are aware of the correct process temperature Set Point.
	High temperature alarm not set properly.	See Section "Temperature Screen Setup" on page 29.
	Process set point is out of acceptable range.	Restore temperature controller to factory pre-sets. Auto-tune if necessary.
Poor Dew Point Performance.	Burned out regeneration heater.	Repair or replace.
	Contaminated or worn out desiccant.	Replace.
	Leaking process air hoses.	Repair or replace.
	Dryer is being operated beyond its capacity.	Check dryer and drying hopper sizing.
	Bad dew point sensor.	Replace.
	Fouled dew point sensor manifold.	Clear obstruction. Air should flow freely through sensor.

### 7-3 Alarms

The Alarm Screen will pop up to show what alarm the dryer is having that moment. Look through the window on the door to see the screen.

### 7-4 Alarm Descriptions

Alarm Code	Alarm Description	Alarm Effect
<b>BV</b>	The Main Air Valve did not maintain or find position. Possible Motor or Limit Switch Failure.	Immediate Shut Down
<b>CV</b>	The Closed Loop Cooling Valve did not find position. Possible Motor or Limit Switch Failure.	Immediate Shut Down
<b>PS</b>	The process supply air temperature switch opened. Possible thermocouple failure.	Process Shut Down
<b>RS</b>	The regeneration air temperature switch opened. Possible thermocouple failure.	Regeneration Shut Down
<b>PH</b>	Process air temperature deviation is above high limit value. Possible solid state relay failure.	Process Shut Down
<b>PL</b>	Process air temperature deviation is below low limit value. Possible heater failure.	Alert Only
<b>RH</b>	Regeneration air temperature deviation is above high limit value.	Regeneration Shut Down
<b>DP</b>	The dew point value is above the high limit value. Possible ambient air contamination or failed regeneration cycle.	Alert Only
<b>PB</b>	Process blower is not running. Possible overload fault, contactor fault.	Process Shut Down
<b>RB</b>	Regeneration blower is not running. Possible overload fault, contactor fault.	Regeneration Shut Down
<b>PF or RF</b>	Process air filter (PF) or regen air filter (RF) requires cleaning.	Alert Only
<b>PR</b>	The process redundant air temperature thermocouple is out of range. Possible thermocouple or solid state relay failure.	Immediate Shut Down.

## 7-5 Determining Temperature Controller Errors or Sensor Errors

### *Using a Thermocouple*

If the controller displays a temperature that is close to room temperature (70°F/21°C) when you short-circuit controller input terminals, the controller is normal and the sensor is probably broken, short-circuited, or incorrectly wired.

### *Using a Platinum Resistance Thermometer*

If the controller displays a temperature of about 0.0°C (32°F) when you insert a 100-ohm resistor between terminals **A** and **-B** of the controller, and you short-circuit controller terminals **+B** and **-B**, the controller is normal and the sensor is probably broken, short-circuited, or incorrectly wired.

**Other service problems or questions can be answered by contacting the Service Department.**

# Chapter 8: Appendix

## 8-1 Technical Specifications

### **Annex B Information**

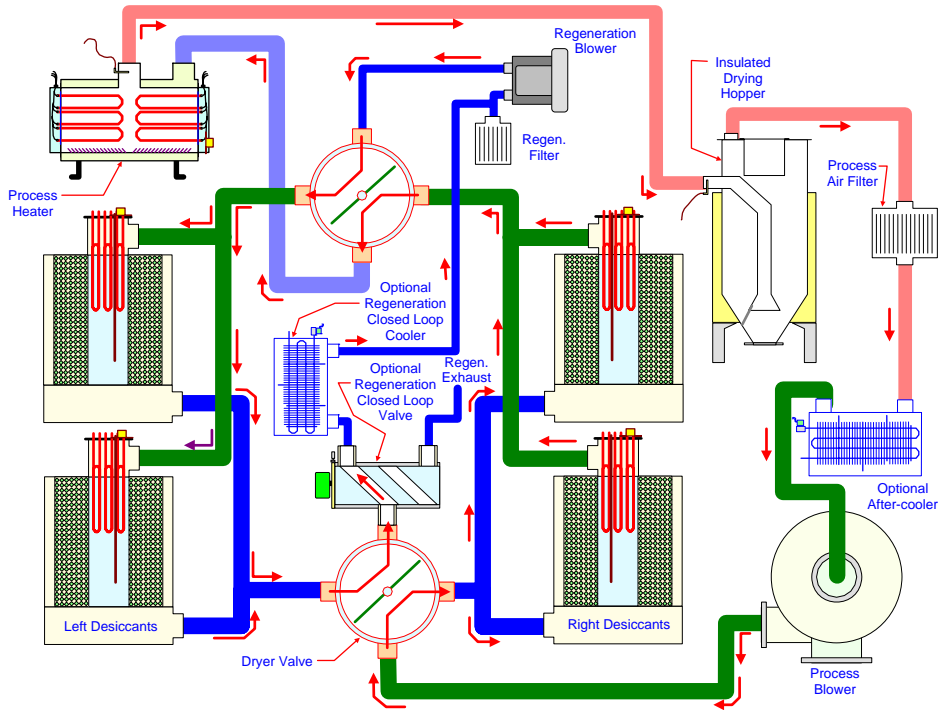
The following design information is provided for your reference:

1. No modifications are allowed to this equipment that could alter the CE compliance
2. Ambient temperature: 0 degrees Celsius – Maximum (104 degrees Fahrenheit)
3. Humidity range: 50% relative humidity
4. Altitude: Sea level
5. Environment: Clean, dust-free and non-explosive
6. Radiation: None
7. Vibration: Minimal, i.e. machine mounting
8. Allowable voltage fluctuation: +/- 10%
9. Allowable frequency fluctuation: Continuous +/- 1%  
Intermittent +/- 2%
10. Nominal supply voltage: 460/3/60 (Verify on serial number tag)
11. Earth ground type: TN (system has one point directly earthed through a protective conductor)
12. Power supply should include a ground connection.
13. Over-current protection is supplied in the dryer, but additional protection should be supplied by the user.
14. The door-mounted disconnect serves as the electrical disconnect device.
15. Dryer is not equipped with local lighting.
16. Functional identification
17. Dryer is equipped with a CE mark
18. Dryer is supplied with an operating manual in the language of the destination country.
19. Cable support may be required for power cord, depending on final installation.
20. No one is required to be in the interior of the electrical enclosure during the normal operation of the unit. Only skilled electricians should be inside the enclosure for maintenance.
21. Doors can be opened with a screwdriver, but no keys are required.
22. Two-hand control is not required or provided.
23. All dryers should be moved around and set in a place with a lift truck or equivalent.
24. There are no frequent repetitive cycles that require manual control—repetitive functions are automatic while the dryer is operating.
25. An inspection report detailing the functional test is included with the dryer.
26. The machine is not equipped with cableless controls.
27. Color-coded (harmonized) power cord is sufficient for proper installation.

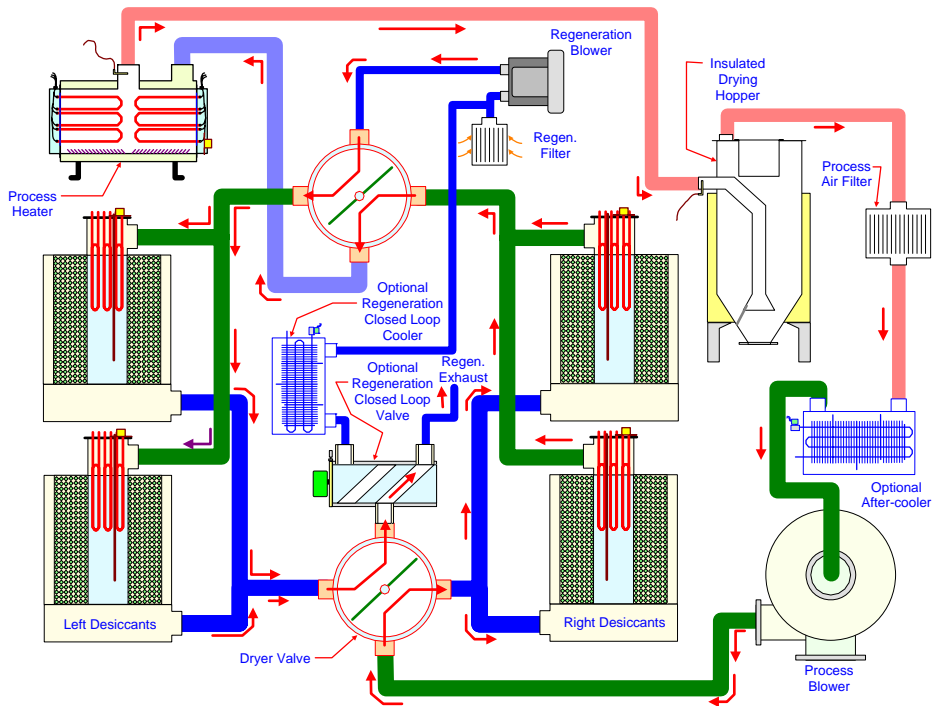
### **Aftercooler Design Specifications**

Entering water temp.	
°F	°C
85°F	29°C

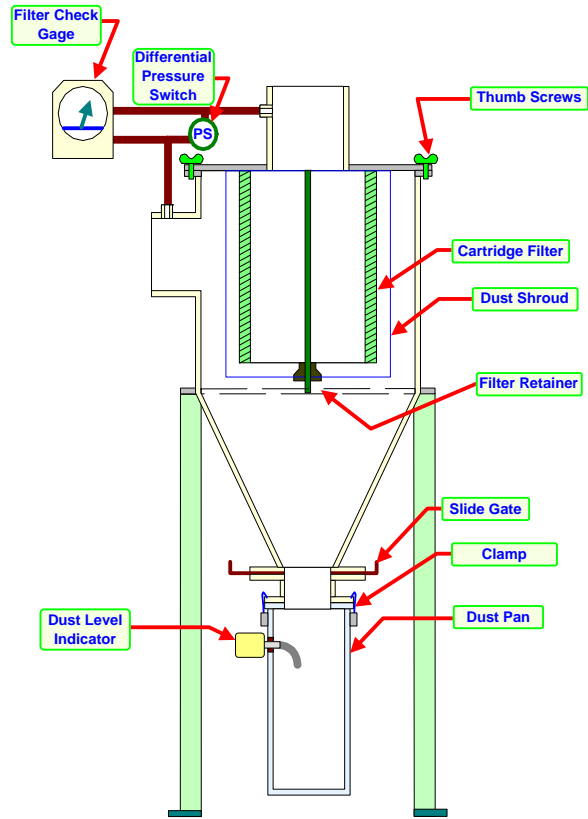
## 8-2 Drawings and Diagrams



**Airflow Schematic: 2000-3000 cfm dryers (4 desiccant beds). Left desiccant beds are regenerating—closed loop regeneration is activated.**



**Airflow Schematic: 2000-3000 cfm dryers (4 desiccant bed). Left desiccant beds are regenerating in open-loop regeneration mode.**



**Optional dryer dust collector**








## 8-5 Dryer Identification (Serial Number) Tag

(Located on back of Dryer)

	<b>XXX Series Dryer</b> <b>Model Number XXX-15</b> <b>Max Drying Capacity HR</b>
<b>460V</b>	<b>Serial Number 060701R</b>
<b>1</b>	<b>Date of Manufacture 06/2003</b>
<b>4.5A</b>	
<b>Over-current Protection Device (s) 4.5A Total</b>	
<b>Frequency 50/60Hz</b>	
<b>Compressed air supply None</b>	
<b>Dryer Mass 400 lbs/(180 KG)</b>	
<b>Electrical Diagrams &amp; Pneumatic Diagram</b>	<input type="text"/>
<b>Street Address</b>	<b>City, State Zip Code</b>
<b>Telephone Number</b>	

## 8-5 Technical Assistance

### ***Parts Department***

Call toll-free 7am–5pm CST [800] 423-3183 or call [262] 641-8610 Fax: [262] 641-8653

The ACS Customer Service Group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. ACS welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

### ***Service Department***

Call toll-free 8am–5pm CST [800] 423-3183 or call [262] 641-8610  
Emergencies after 5pm CST, call [847] 439-5655

We have a qualified service department ready to help. Service contracts are available for most products. Service contracts are available for most of our products. [www.acscustomerservice.com](http://www.acscustomerservice.com)

### ***Sales Department***

Call [262] 641-8610 Monday–Friday, 8am–5pm CST

Our products are sold by a world-wide network of independent sales representatives. Contact our Sales Department for the name of the sales representative nearest you.

### ***Contract Department***

Call [262] 641-8610 Monday–Friday, 8am–5pm CST

Let us install your system. The Contract Department offers any or all of these services: project planning; system packages including drawings; equipment, labor, and construction materials; and union or non-union installations.

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